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CHEMICAL WEEKLY

VOL. XXXIII

JANUARY 26, 1988

NO. 20

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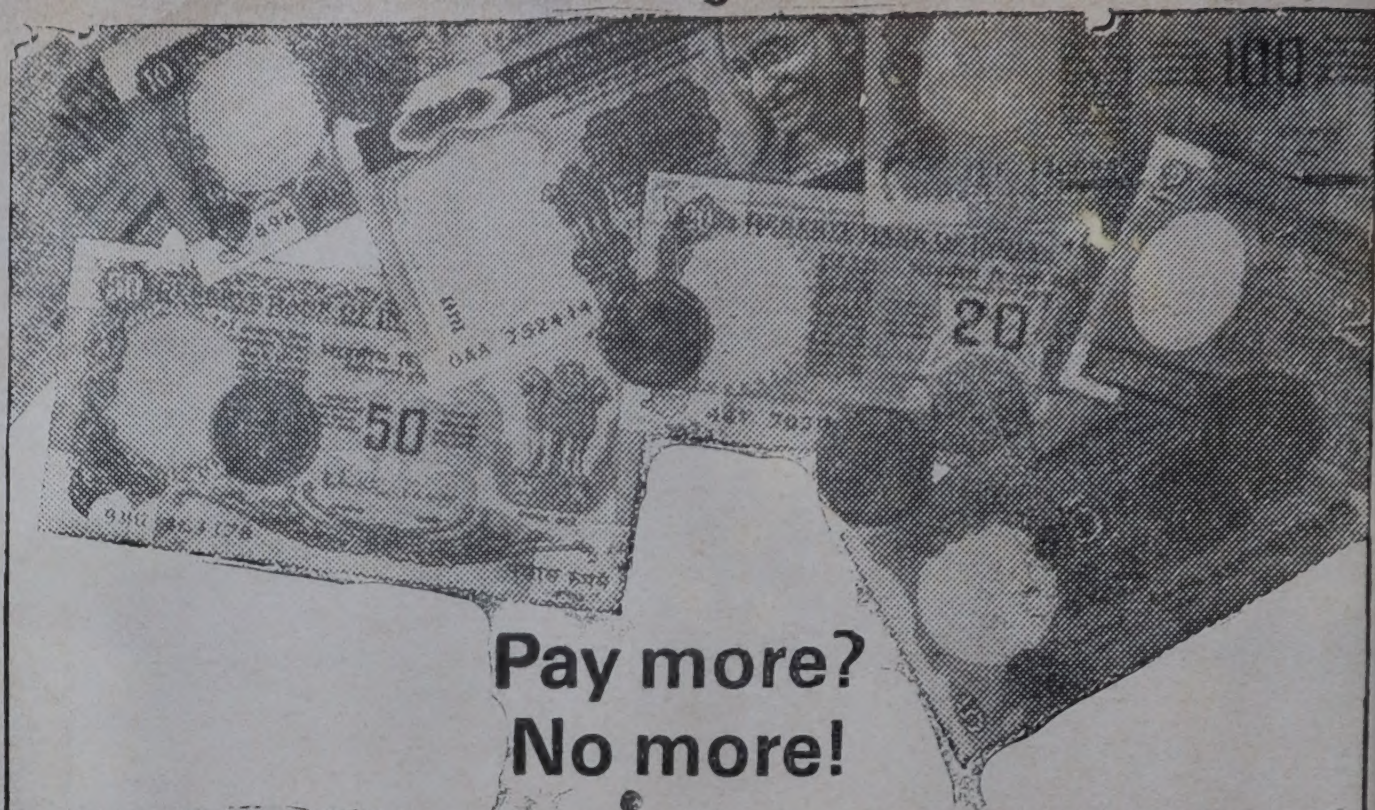
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Telex: 1173635 BSM IN

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- ☐ Textiles — Man-made Fibres.
- ☐ Printing Inks, Stencil Fluids, Pen Inks, Lacquers, Industries.
- ☐ Drugs and Pharmaceutical Industries.
- ☐ Cosmetic Industries
- ☐ Plasticizer Industries.

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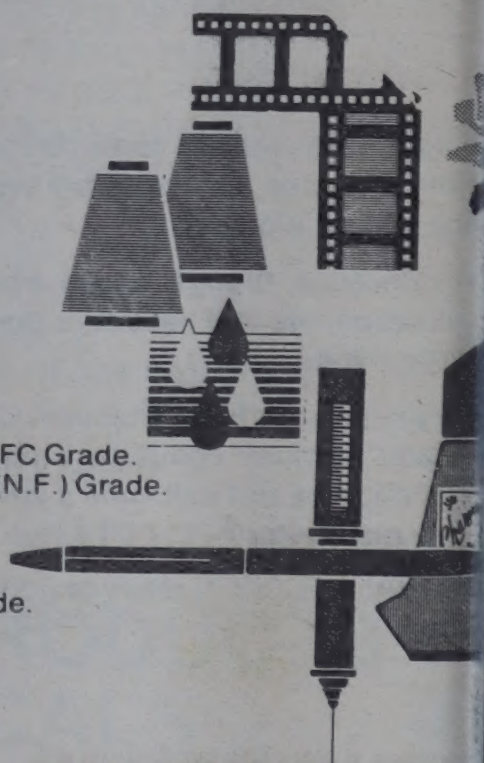
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Phone: 6722280, Gram: AROSILVASSA, Telex: 011-78077 FAIS IN
- IPUR** : Chemdet Enterprises, Shop 67, 75/232, Sabji Mandi, Kanpur.
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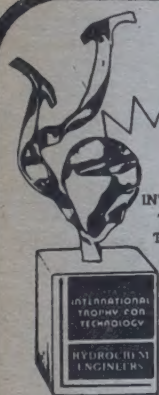
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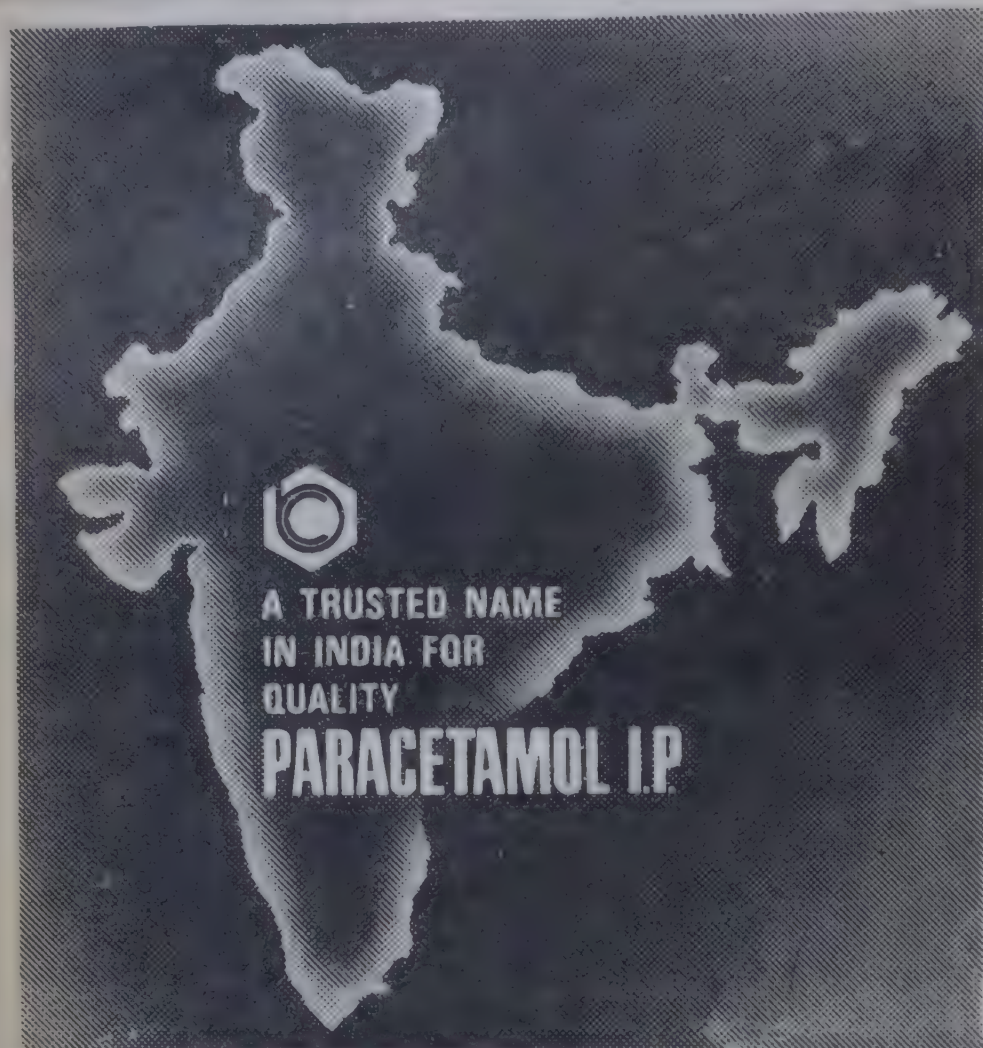
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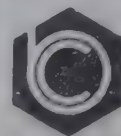
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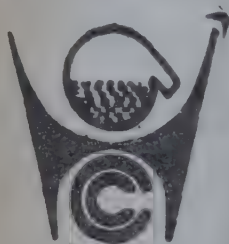
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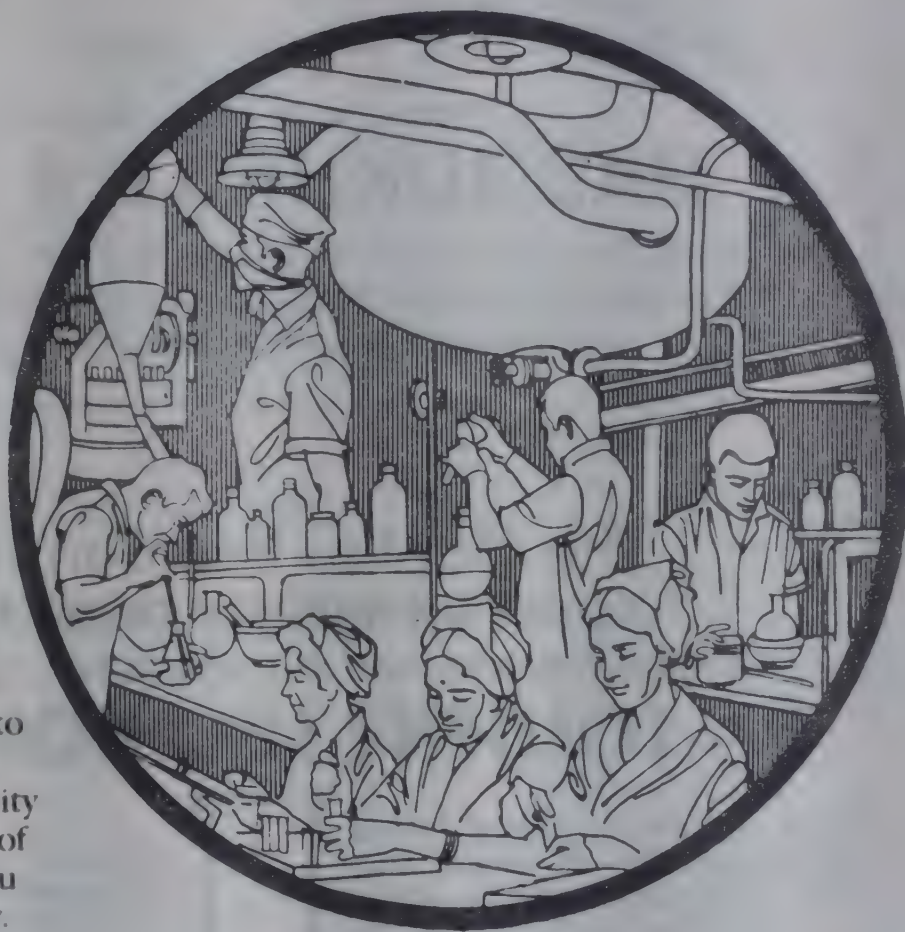
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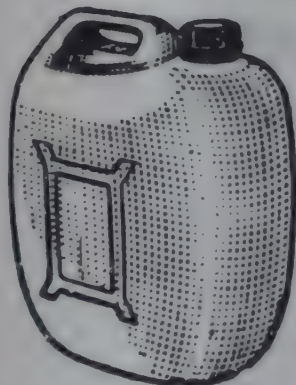
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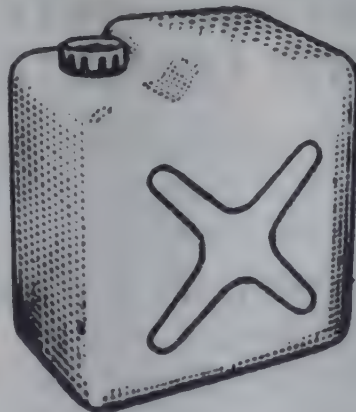
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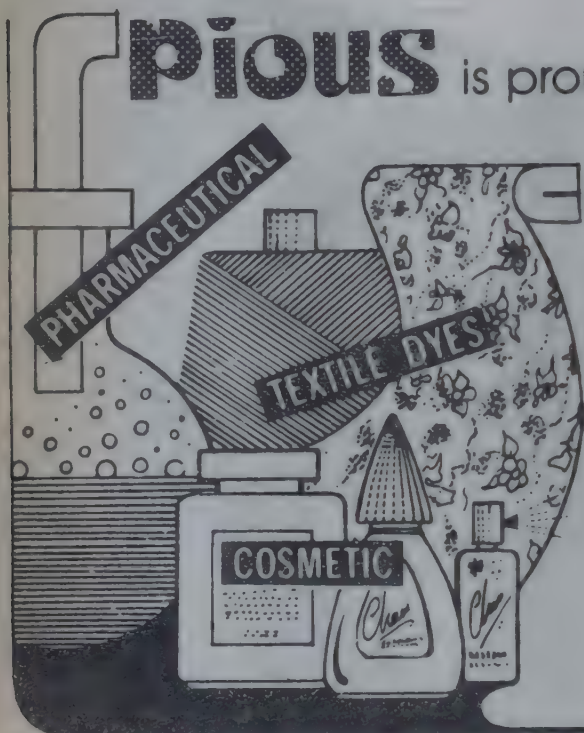
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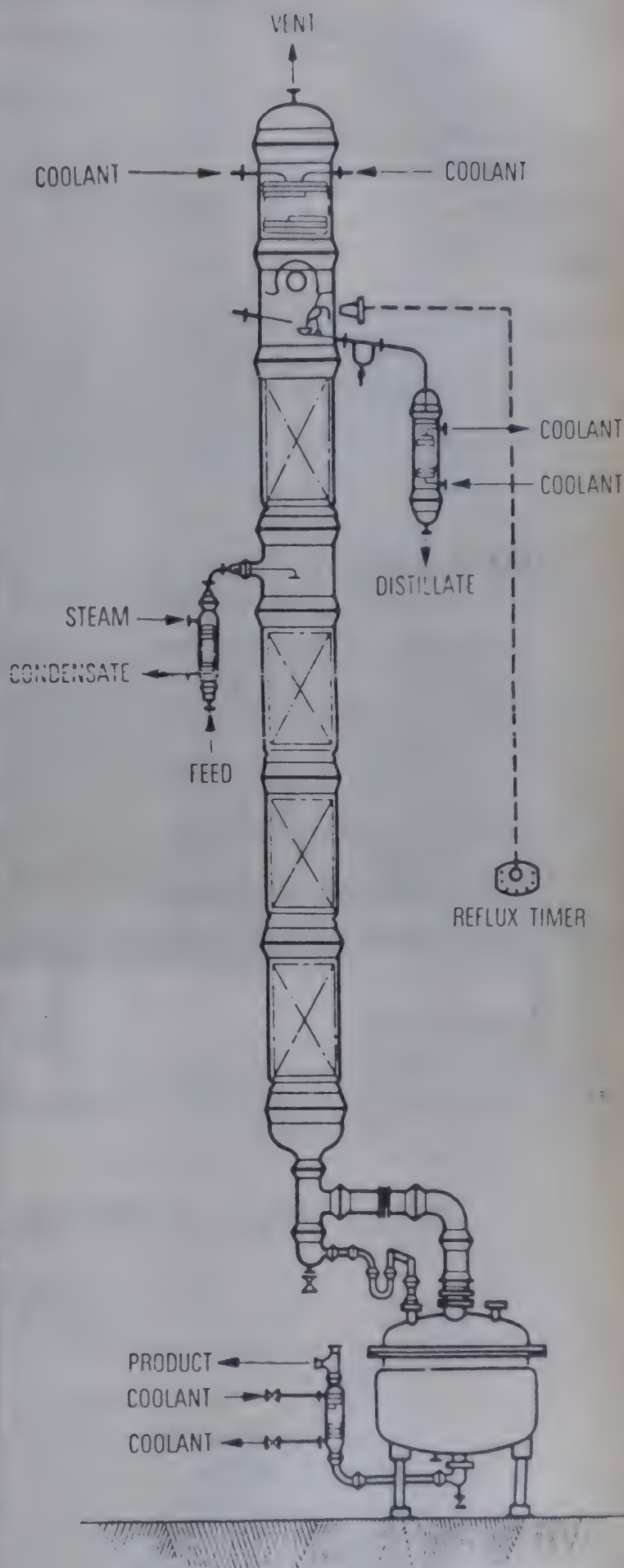
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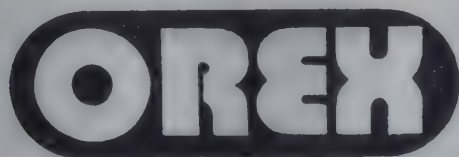
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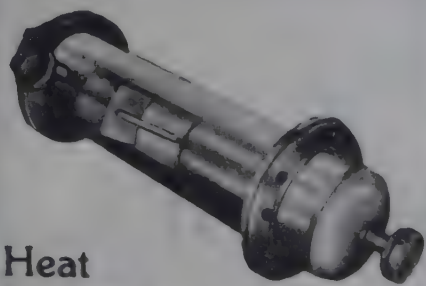
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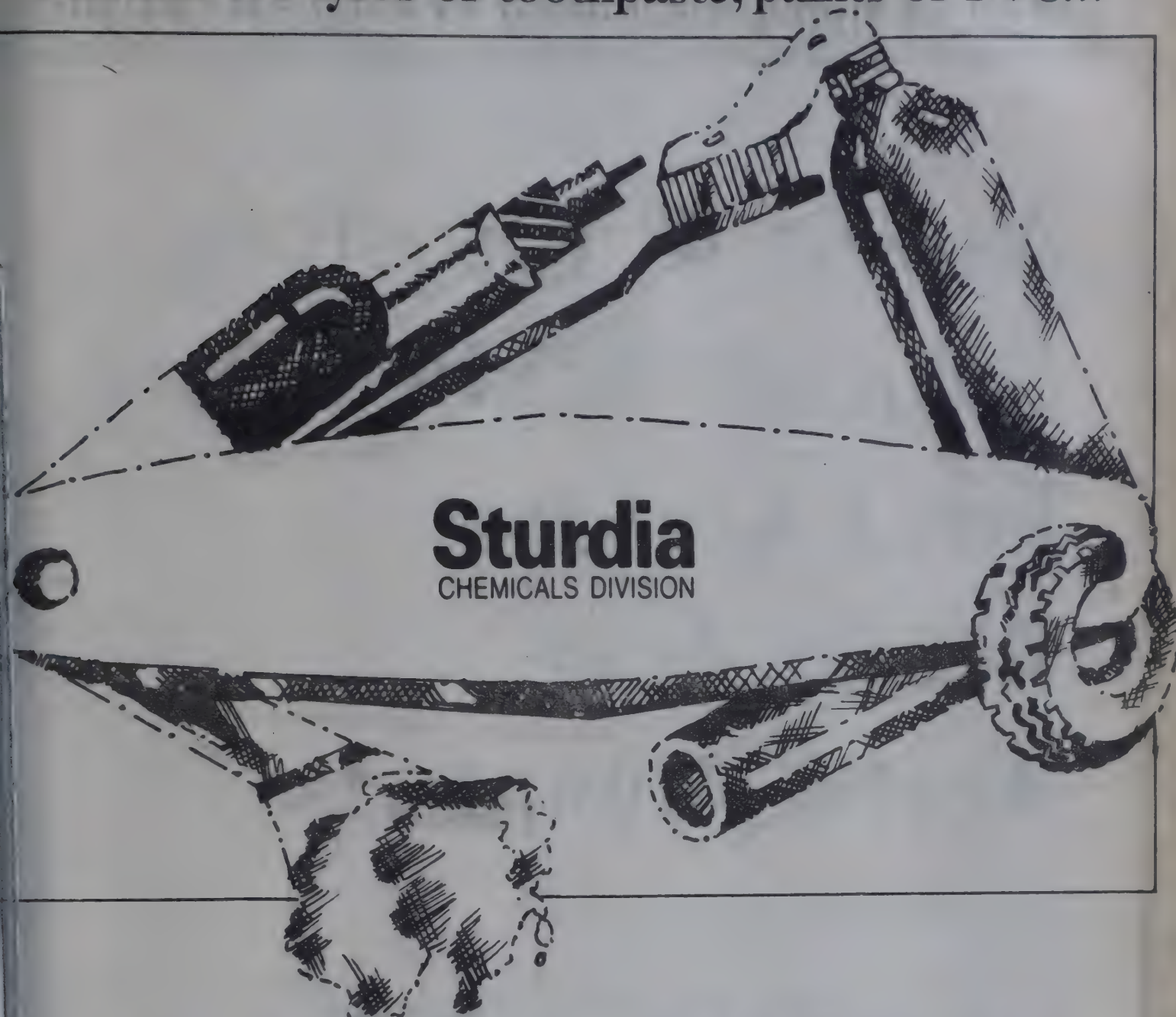
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CHEMICAL WEEKLY

VOL. XXXIII

JANUARY 26, 1988

NO. 20

Optical Fibres -- Where Light Out-Performs Electrons

tion that began in the mid-sixties, in the technology transmitting information has today completely taken of telephones, television, video data and commun- the rebel force is the optical fiber --a thread of purest to thousandths of an inch in diameter, about the size in hair through which laser light of high purity and can be transmitted. Recent advances in optical fiber show that dazzling amounts of information can be hough just a single fiber on beams of light. By blend- at light colours together hundreds of thousand of calls or hundreds of T.V. channels can travel simul- through a glass fiber. The newest technique for g and receiving fiber optic signals could eventually million phone conversations or 10,000 super sharp hells to travel through one fiber. This transmission called coherent detection may one day make it pos- one record a four hour feature movie flashed into e in one second.

plest form, an optical fiber, typically 0.15 mm in dia- consists of central core region in which light transmis- is, encased in a cladding with a smaller refractive at the light passed down the core undergoes total ection at the core-cladding interface and thus cannot his apparently simple structure is not easy to man- with the perfection and purity required.

ne optical fibers, two glasses with different optical are combined to form a central core with a surround- ng that traps light by reflection. At Corning's plant, t as glass rods rotating on a lathe within a sealed e Ultrapure gases that contain silicon and germanium rough a flame, spraying the rod with a white soot s up as thin layers of glass. When the germanium t shut off, an undoped layer of glass forms the out- ling. The cylinder is then fired in a furnace to pro- ghly transparent glass blank called a preform, from es are drawn. The glass is so pure that light must hough nearly 14 miles of it before the light intensity is e comparison, 10 feet of high-quality optical glass and of window glass will halve light intensity. Corning e first fiber suitable for communications in 1970. The Telephone & Telegraph Co. (AT&T) also a major ar, uses a different patented manufacturing technique.

Researchers at Bell Labs also devised a way of making low-loss fibers by reducing the impurity, called a dopant, added to fibers to boost the refractive index of the core.

It is not, however, practical to use fibres produced in this simple way directly because their surface is extremely sensitive to mechanical damage, which greatly affects their mechanical strength. Even winding onto a drum can reduce strength by a factor of 10 or more. A way around this problem is to protect the fibres as they are produced with a thin coating of polymer. Obviously this polymer must cure rapidly because at 25m/ min the dwell-time in the curing zone would be in the order of a second. Thermally cured silicones and UV cured epoxy-acrylates have been used successfully, but there are many other possibilities.

Such primary coated fibre can be stored on drums, but before real use, it requires a secondary coating of yet another polymer, e.g. nylon, to provide additional mechanical strength and protection. It can then be formed into cable. Here, too, there are some problems in the material chemistry in order to prevent undue extension of the cable in use.

All glasses are known to be brittle solids, in the sense that they are weak in tension, fracturing at low strain. Silica glass fibre, provided that its surface is protected as noted previously, can be made sufficiently perfect and flaw-free that kilometre lengths can withstand an extension of 1 percent or more. This however is only under dynamic test. With static loading, fibres can eventually break at much lower extension. It has been suggested that this static fatigue is due to the action of water in inducing stress corrosion at incipient surface flaws that are partially opened under load. That however remains unproven. What is clear is that no detailed understanding exists of the chemistry and structure of such glass surfaces.

It should be emphasised that silica glass fibres are exceptionally strong in comparison with those made from other glasses. Any other candidate materials for making optical fibres are likely to be weaker and therefore will introduce additional problems, particularly in cable design.

Researchers at Bell and other labs are also developing ultralow-loss fibers based on fluorides and other non-silica

glasses. The Naval Research Laboratory, in Washington, D.C., announced it has developed a fluoride glass that may one day go into fibers capable of carrying signals thousands of miles without need for repeater amplifiers.

But to achieve such remarkable performance, improved semiconductor lasers will also be needed. Longer light wavelengths pass through fibers with less attenuation, and wavelengths near four microns may be used for non-silica ultralow-loss fibres. By contrast, early fibres in telephone networks used lasers with wavelengths at about 0.82 micron, contributing to the need for a repeater every five miles or so. Current single-mode fiber systems may use a near-infrared wavelength of 1.3 microns, with repeaters 20 miles or more apart. Light attenuation is still lower at 1.5 microns, and the newest fibers and lasers for this wavelength may have 90-mile spacings.

In addition to increasing the wavelengths of lasers to minimize attenuation, researchers must make them switch on and off faster to handle more data. Semiconductor lasers for some optical-fiber phone systems are already pulsing digital signals in the 1.7-gigabit-per-second range (a gigabit is one billion bits); and much faster experimental lasers have been demonstrated in labs. But stability problems may crop up as lasers are pushed to extremes. Last year researchers at Bell Labs used an experimental lithium-niobate switch to pulse a continuous laser beam and transmit an eight-gigabit-per-second signal through more than 42 miles of optical fiber.

In recent years, advanced optical fibers created by AT&T, Corning Glass Works, and other firms have spun off production lines into a growing network of fibers. AT&T and other telecommunications firms, for example, have switched from copper wire to optical fibers for long-distance lines. Upcoming trans-Atlantic and trans-Pacific undersea cables will also use glass instead of copper. Optical fibers now carry some information once relayed through satellites and other microwave links. In Japan, Europe, the United States, and elsewhere, experimental two-way fiber systems have fed information directly into homes. One pair of fibres in such a system can provide a household with phone and cable-TV service, plus tele-banking and video shopping. Such cable shopping services may one day let us purchase music and video recordings transmitted to your home recorder in seconds.

Among the advances influencing this revolution:

- * **Ultraclear glass.** Manufacturing advances now produce remarkable transparent fibers. As a result, signals flashing through them -- usually bursts of laser light -- can travel tens of miles before a costly amplifier is needed to boost them. Ordinary copper-wire phone cable carrying electrical signals need an amplifier every few miles.

- * **Advanced lasers.** New semiconductor lasers can now be switched on and off rapidly enough to send thousands of telephone calls on a single optical fiber, compared with hundreds of calls for earlier light sources. Fiber networks can therefore handle more information by using faster lasers instead of addi-

tional cables -- an important consideration since expensive to install.

- * **Super-capacity networks.** Experimental techniques for beaming signals through fibers may boost system information-carrying capacities to fantastic levels -- 1,000 times higher than today's already impressive rates. These laboratory systems use ultraprecise light frequencies and receivers with lasers that reinforce light signals weakened by losses through long fibres.

Ironically, these advances also helped slow a boom in fiber use. During the first half of the 1980s, fiber demand exploded as new telecommunication firms began competing for a share of the long-distance market. Last year, for example, U.S. Sprint Communications, Inc., had completed 5,200 miles -- about a third -- of its planned optical fiber network compared with AT&T's 5,200 completed miles. But demand for fiber cables levelled off, in part because optical transmitters can now beam more calls along single fibers. In addition, a huge demand for optical cable at homes with local telephone switching offices has not yet taken place as expected.

Paradoxically, while 1.7-gigabit-per-second fiber systems soon cross the United States, the first trans-Atlantic system and the trans-Pacific system in 1989 will operate at 296 megabits. The reason, Bell Labs experts explain, is that specifications for these systems must be frozen early to ensure reliability. But despite the 296-megabit rate, the Atlantic cable will handle 37,800 telephone calls on each of two fibers, thanks to a technique of compressing digital signals (AT&T discovered it either had to armor or bury its new cables to protect them from sharks, seemingly attractive fields produced by current powering the repeaters).

Extraordinarily high signal-carrying capacity is one of the important benefits offered by optical fibers, but it is not the only one. Since electronic signals are converted into beams of light for fiber transmission, they are immune to present-day eavesdropping ("Bugging"). Fibers are equally immune to electrical or radio interference, and they won't short out. Nagel (R & D Chief) looks back with awe at the progress of optical fiber technology in the past decade. She recalls attending conferences with colleagues, waiting to hear announcements that often bog down emerging technology. "I never seemed to be very many to tell about," she says. "The problems that were reported seemed to be solved fast. Now, after just a few years, we have a large-scale manufacturing technology. The communication systems of the United States are truly being revolutionized by the light-wave communications. It's incredible, and it's unparalleled."

It may be of interest to learn that the Western Railway is celebrating their Diamond Jubilee Celebrations (Jan. 88) are including the laying of an optical cable fibre from Churchgate to the City (Source: *Popular Science*, Oct. 1987).

HEMARENA

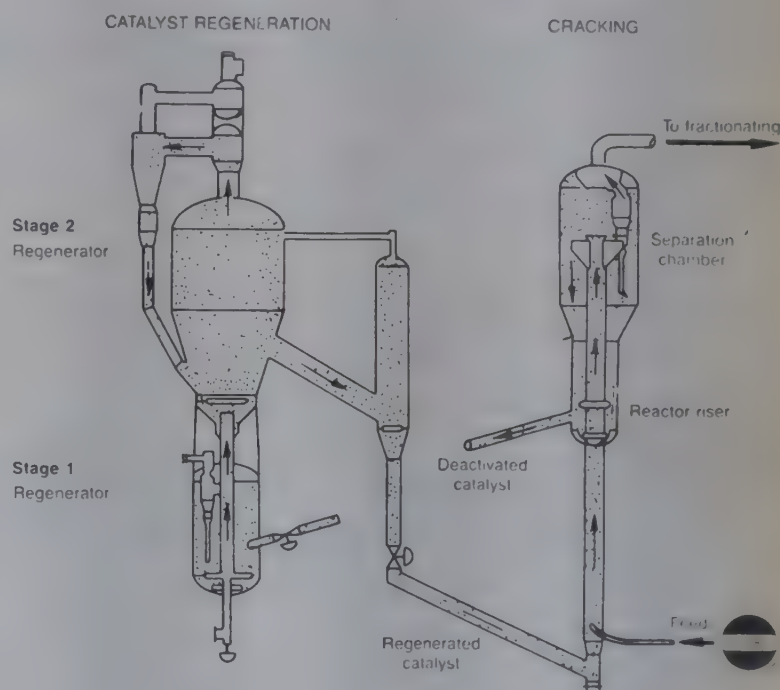
VENKITESWARAN

New Refining Developments

Carbon Processing Of Sep. 87 features new developments in refining. Among the features dealt with are improved designs of Fluid Catalytic Crackers -- one of the prime units in modern refineries. Development at Idemitsu Kosan, Japan, features a fluid cracker with two regenerators, based on developments of Total and IFP of France. The unit has a 5000 bpd capacity and has cost \$95 million. A process termed R2R Resid Cracking denotes the use of cracking with 2 stages of regeneration. It handles feeds having high metal content (upto 50 ppm) and Conradson carbon. Residues of crude oil distillation are a problem and conversion to saleable distillates is the solution through FCC or hydrocracking. In the R2R system there is continuous deposits on the catalyst and the system of continuous regeneration and catalyst mass is essential and ingenious solid material flows have been evolved. In the R2R the feed is sprayed into the unit in fine droplets and the catalyst flow is improved with the double stage regeneration system. Gasoline and diesel yields are said to be higher and catalyst consumption lower. A flow diagram is shown in Figure 1.

The two regenerators operating first are at 700°C and then at 900°C to eliminate all coke deposits. The cracking of residuals to volatile fuels is a must in refining as the scope for use of fuel oil is getting smaller and less. Another development is the increasing demand of oxygenates for the gasoline pool due

to more stringent anti-pollution drive. They also contribute to octane rating and offset the reduction or elimination of TEL. There are many oxygenates (alcohols or ethers) which can be made from refinery olefin intermediates -- propylene and isobutylene. These olefines can also be converted into non-oxygenates. The typical yields of different oxygenates and non-oxygenates from these and their octane rating is given in Table-1. Typical investments and requirements for the major oxygenates is given in Table-2.



Flow diagram depicting R2R technology

Table-1: TYPICAL YIELDS PER 100,000 TONS FEED

Feed	Mogas Component	Volume cu.m.	Octane (R+M)/2	Pool Contribution 10 ⁶ (Octane)(cu.m).
RESID FEED	Isohexenes (Dimate)	147,000	090	13.2
	Isopropanol (IPA)	177,000	106	18.8
	IPA + MeOH (40/60)	442,000	106	46.8
OLEFIN FEED	Isooctenes	139,000	101	14.0
	Alkylate	295,000	095	28.0
	Tert. butanol (TBA)	158,000	100	15.8
	TBA + MeOH (40/60)	395,000	106	41.9
	MTBE	210,000	106	22.3

Table-2: TYPICAL INVESTMENT AND UTILITY REQUIREMENTS

	IPA	TBA	SBA	MTBE	
Feed Type	Propylene	Isobutylene	n-Butylene	Isobutylene & Methanol	Na & M
Quantity, tons per product ton	0.72	0.77	0.79	0.66iC ₄ / 0.36 MeOH	
Purity basis, %	92	45	96	54-15	
Investment (Basis: 100,000 tpy product, battery limit, Germany mid-1986), U.S. \$ per tpy product	150	110	120*	92-135	
Utility requirements, per metric ton					
Steam, low press., tons	0.3	0.4	1.2	0.3-1.1	
Steam, mid press., tons	1.3	1.1	0.8	--	
Electricity, air cooling, kWh	100	55	110	15-28	
Water, cooling, cu. m. (10°C rise)	7	50	6	18-24	
Water, process, cu. m.	0.7	0.4	0.3	--	
Chemical and catalyst, approx U.S.\$	3	2	3	0.15-0.25	

- *** \$130 per tpy add-on for molsieve olefin recover unit at 67% n-butylenes in feed.
- *** Light cracker (C₄-C₇) naphtha etherification. All data per ton naphtha feed.
- *** 0.05-0.15 ton methanol per-ton naphtha feed.

A block diagram of the refinery products to oxygenates/alkylates is shown in Figure-2.

Today's prime compound is MTBE but this needs methanol from an outside source. IPA or isopropanol is totally from propylene and holds promise as a component and the conversion of propylene is quite efficient. Butanols based on butylenes also offer scope. However, tertiary butanol (TBA) is mainly the coproduct of pro-

pylene oxide manufacture and therefore linked natural feeds and products. SBA is made from n-b in a way similar to IPA and from the C₄olefir removal of isobutylene.

There is the likelihood of IPA and SBA find way into gasoline in association with methanol serve as co-solvents which prevent separation anol when water gets mixed accidentally.

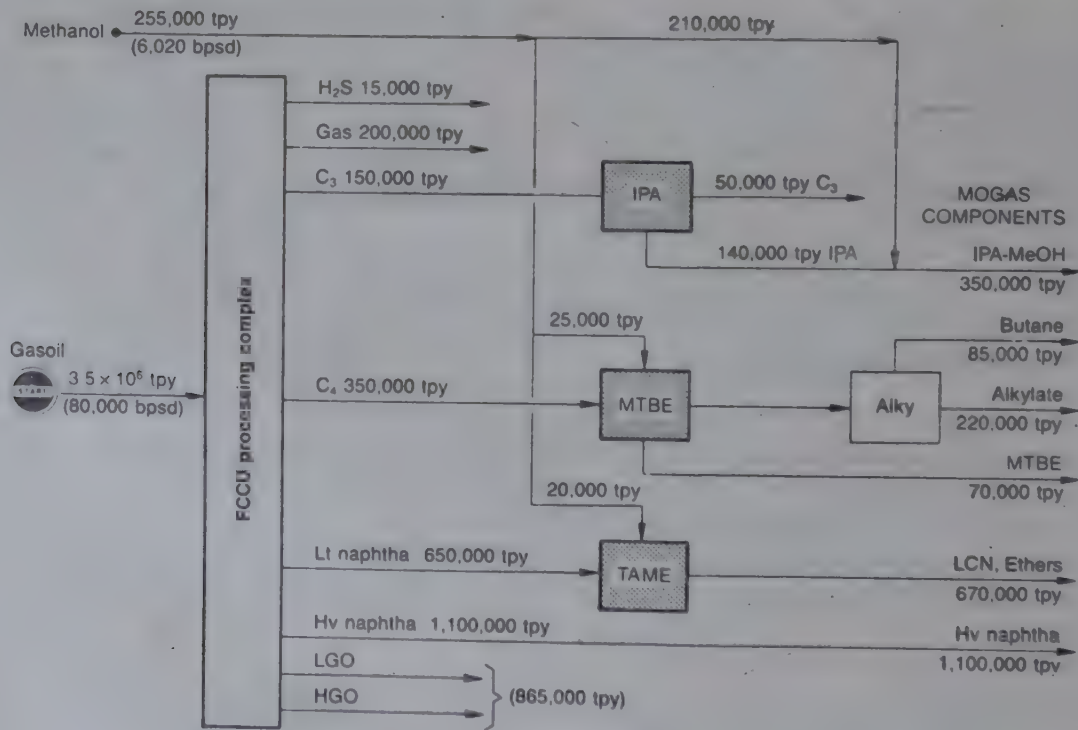


Figure-2.

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Small detergent units seek fiscal sops

The small-scale detergent and soap industry has chalked out a six-point action plan to boost production and ensure a bigger share in the market, besides smooth availability of raw materials at rational prices and finances at the right time in addition to various fiscal incentives.

The action plan has been formulated at a recent workshop held in Calcutta by a panel chaired by Professor M.M. Chakrabarty, former Vice-Chancellor of Jadavpur University, Dr. R.N. Mukherjee, professor of chemical engineering of the same university, Mr. A. Satish Kumar, chief marketing manager of Tamil Nadu Petroproducts Ltd, Mr. K. Shyamji of Small Industries Service Institute, Mr. V.K. Jain, president of the institute and Dr. B.P. Sen.

The action plan, according to Mr. Jain, emphasised the need for evolving a system to ensure that the working capital requirements of the industry are adequately met by the banking institutions. Moreover the margin money share of small-scale entrepreneurs should be considerably reduced.

In view of the large promotional needs of the industry, the financial institutions should arrange soft loans similar to the term loans to meet the huge promotional needs of the units. The banking charges and commissions covering outstation cheques, drafts/bills for the small-scale entrepreneurs should be restored to their earlier levels.

On the marketing front the industry wants that the State small industries corporations and the national small industries corporations should purchase detergent products from the SSI units and arrange for sale of the same through their network. The concerned Ministry and authorities can market the products of the SSI detergent and soap units through public distribution systems whereby quality products can be made available to the common man at a reasonable price both in urban and rural areas.

The action plan underlines that the Doordarshan authorities should allow significant rate discounts to the small scale units for advertisements through the media. The Information and Broadcasting Ministry should also evolve a system whereby it is possible to release advertisements through televi-

sion to cover the entire Eastern region, and that too, at proportionate rates.

Regarding raw materials, it has been pointed out in the action plan that at present the linear alkyl benzene (LAB) is made available to the SSI units in this region at a much lower rate by the Indian Petrochemicals Ltd (IPCL) compared to that manufactured by the Tamilnadu Petroproducts. The industry has requested TPL to consider supply of their LAB to the SSI units in this region at IPCL rates. State Governments have been requested to ensure other raw materials manufactured outside their States are made available at the same rate that is applicable to the manufacturers in other regions.

Referring to the need for various financial incentives, the industry states that the West Bengal Government should allow a five-year exemption of sales tax and octroi duty to augment the employment opportunities further. The Government of Gujarat has recently reduced the Central sales tax to one per cent for all detergent products going out of the State.

The excise duty on detergents should be framed on the basis of assessable value in line with the duty applicable on soaps where the excise duty is only 5 per cent with the assessable value of Rs. 12,000 per tonne, 15 per cent for soaps with assessable value between Rs. 12,000 to Rs. 25,000 and 25 per cent for soaps with assessable value exceeding Rs. 25,000 per tonne. The industry is also of the view that the Union Finance Ministry should withdraw the notification number 190/87 in the overall interest of the small-scale sector and should take up the case very strongly with the concerned authorities.

The IPCL should be requested to allocate quota of polygranules to the small scale detergent manufacturers of this region, the action plan says.

According to Mr. Jain, the Eastern region's requirement of detergent per annum is 100,000 tonnes. Of this, only 10,000 tonnes are manufactured by the small scale units. The organised industry contributes around 30,000 tonnes. The balance 60,000 tonnes come from outside the Eastern region. This showed, he added, there was vast potential for the industry to

expand their production provided required help and financial aid are given by the concerned authorities.

HALF-YEARLY REVIEW OF PLASTIC DUTY STRUCTURE CALLED

The plastics industry has been going through a very difficult period for quite some time now due to shortage of raw materials. In the international market prices are soaring. For instance, the price of HDP was being quoted at US \$ 600 last, is now being quoted at 1,200. Consequently, the plastics processing industry is not able to get raw materials though they are under OGL.

The industry welcomed the decision of the Government to effect a review of the plastic duty structure on various plastics materials with effect from September but it has not been able to derive benefit from the concessions as international prices continue to rise, says Mr. Anil B. Gorodia, President, All India Plastic Manufacturers Association.

The association, therefore, has suggested that there should be a specific duty on various raw materials and the duty structure should be reviewed every six months. If this is done, the industry would be able to get raw materials at prices on par with the indigenous prices for meeting its requirements.

The Government has not responded favourably to the suggestion. Similarly, the association has requested for a review of the excise duty structure to bring down the domestic prices.

It has suggested for instance, that the excise duty on all thermosetting plastics/resins should be brought down to the level of 15 per cent.

Similarly, the duty on polyethylene should be reduced to 15 per cent. This raw material is widely used in manufacturing important products like cables, pipes, sheets and foams.

Alongwith the duty reduction, the Association has also suggested that the prices of naphtha delivered to the petrochemical industry should be reduced to par with that of fertiliser industry. The plastic raw materials are derived from naphtha.

The delivery price of naphtha by the petrochemical industry has been steadily rising from Rs. 1.105 per

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CHEMICALS, PHARMACEUTICALS:

Scope for tie-ups with Thailand

The potential for joint ventures with Thailand in the field of chemicals and pharmaceuticals remains untapped.

According to an investigation conducted by the Trade Development Authority (TDA), a promotion body under the Ministry of Commerce, Thailand's chemicals industry, despite the continued investment in local manufacturing, still depends on overseas suppliers for its raw materials.

To encourage investment in priority sectors like chemicals, the Thai Board of Investment offers a number of promotion privileges to overseas investors.

Privileges granted to overseas firms may include tax holidays, guarantees against competition, waiver of import duties on machine components and raw materials, and assistance with residency permit.

Sources point out that in the pharmaceuticals and fine chemicals sector, there are opportunities for Indian investors because the local manufacturers and formulators are expanding rapidly to meet the needs of the domestic market as well as export.

It is stated that India has been doing quite well in exports of chemicals and related products which increased from Rs. 3.94 crores in 1983-84 to Rs. 4.37 crores in 1984-85 a rise of 11.06 per cent.

Though, there was a decline in India's total exports to Thailand from Rs. 45.53 crores in 1983-84 to a low of Rs. 27.86 crores in 1984-85, the share of chemicals and related products went up from 8.7 to 15.6 per cent.

This, the sources say, is an indicator of the demand for Indian chemicals and products, which could be converted into production collaboration agreements with clauses for joint exports to third countries.

As far as export potential is concerned, sources say, the biggest users for chemicals in Thailand are the producers of mineral acids, sulphates, chlorine and chlorinated products, soaps and detergents, pesticides, fertilisers, plastics and paints. The indus-

try is diverse and rapidly expanding in size.

Recently, India exported hydrocarbons, NES and their halogenated sulphonated, nitrated or nitrosated derivatives, nitrogen function compounds, pigments, paints, varnishes and other related items in the face of stiff competition from established exporters.

BHOR WAVELOCK TO ENTER MARKET

Bhor Industries, pioneer company in the field of plastic products in India and managed by Thanna Group is launching a new company, Bhor Wavelock Industries Ltd., to manufacture nylon reinforced with plastics.

To partly finance the new Rs. 2.80-lack project, the company is entering the capital market in the third week of February. It will issue 3.71 lakh equity shares of Rs. 10 each for cash at par and 46,200 partly convertible debentures of Rs. 150 each. Forty per cent of the shares are reserved for Bhor Industries and 60 per cent for the public according to Mr. K. Tanna, Managing Director of Bhor Industries and Director of Bhor Wavelock.

Of each debenture of face value Rs. 150, Rs. 50 will be converted into 5 equity shares of Rs. 10 each, six months from the date of allotment.

The project which has been set up within five months is situated in Satara MIDC, Maharashtra, a notified backward area. It is thus eligible for various incentives and concessions like Special Capital incentives, sales tax etc. Satara is well connected by road and has adequate water and power supply.

The main plant has been supplied by Japan Wavelock Company Ltd. The versatile product is being introduced for the first time in India. It has a synthetic filament with PVC and is water and weather proof, fire resistant, flexible and does not wear and tear easily.

It can be used for manufacturing tough, soft baggage, protective garments, upholstery covers for valuable machinery, equipment and grain. It

will be useful for the fertiliser tions, plastic garment manufacture luggage industries etc.

HDPE CAPACITY EXPANSION URGED

The immediate expansion of capacity in the country is the solution to the problems being the plastic processing industry to PIL, a company manufacturing and supplying nearly 40,000 the estimated 1,20,000 tonne HDPE consumption in the co-

About 18 months back, PIL had submitted an application to the govt of India for a massive modernisation and expansion of their plant to a capacity of 1,50,000 tpa of HDPE. The expansion plan is linked with NOCIL, the only feedstock. Approval for NOCIL's expansion is awaited.

According to a press release, PIL, the Indian situation today is a dependence of HDPE imports. It has been different if the govt had given timely approval for expansion of indigenous capacity.

KAPL BAGS PRESTIGIOUS AWARD

Karnataka Antibiotics and Pharmaceuticals Limited (KAPL), a public sector company has been selected by the Bureau of Public Enterprises, ministry of industry for an award for 'excellence in performance' for the year 1985-86.

The award was given by Minister, Mr. Rajiv Gandhi at the inauguration function of the conference of chief executives of the public undertakings at New Delhi on January 14.

KAPL is one of the only firms in the sector undertakings which was among 208 central public sector undertakings.

KAPL with a total investment of three and half crore rupees has a profit before tax of Rs. 40

The company also won the quality excellence award for 1986 and AMCO shield award for excellence for harmonious employee relationship for 1986.

Gandhar set to hit oil output rate

production touching 800 tonnes at Gandhar, phase I of this Rs. 327-crore World Bank project appears to be all set to hit the production rate of 6.4 million tonnes of oil per year and 16.26 million cubic metres of gas per day by

in Gandhar field wherein the present activities are envisaged, covering the central part of the area (100 sq. km). According to officials, as on January 15 this year, 10 rigs are in operation and 20 rigs have already been completed out of 25. 19 wells showed presence of oil and 17 were under drilling, 17 wells were connected to early production system (EPS) for assessment of production and generation of revenue. The field is under trial production since 1986.

According to the present assessment, the field has a firm potential of 10 million tonnes per annum with scope of increasing up to two to three million tonnes. The conceptual plan for the field has been prepared to develop the field in an organised and phased

World Bank-aided project also envisages laying down of a pipeline to transport oil and gas from Gandhar to Baroda via Dabvka from where it will be carried to Koyali refinery. The Steel Authority of India has been given the supply order for laying of pipeline at a cost of Rs. 11 crores.

It is also planned to set up a self-sufficient liquefied petroleum gas plant at Ankleshwar producing 100,000 tonnes of LPG per year.

Geognosticated resources of the Gandhar belt is about 466 mmt, out of which about 124 mmt of oil and 16.26 million tonnes of gas have been projected.

Gandhar field is located about 37 km south-west of Baroda and 37 km west of Bharuch. The first well in the structure was drilled in 1984 and oil and gas flows were first found in April, 1984.

Entire Gandhar-Dahej belt encompassing an area of 800 sq km from the Dhadhar river to the Tapi river in the south is considered to be a high potential area for exploration and subsequent development activities.

Gandhar has been put on early production system (EPS). The system has been introduced in the western regional business centre (WRBC) with a view to giving thrust for the acquisition of adequate knowledge of field

Natural gas reserves may go up

India's natural gas reserves, which have increased five-fold over the last decade, are expected to go up from the present level of 1,005 billion cubic metres to 1,251 billion cubic metres by the end of the Seventh Plan.

According to Oil and Natural Gas Commission (ONGC) sources, large reserves had been discovered in Bombay offshore, Tripura, Krishna-Godavari and to some extent, Rajasthan and Andamans in recent times.

The changes of finding more gas in these basins as also Jammu and Kashmir and Himachal Pradesh were quite bright, they added.

ONGC had achieved a sale of five billion cubic metres of natural gas in 1986-87. This figure is planned to be doubled this year by improving the utilisation factor, they said.

Sources claim a 201 per cent increase in gas sales as compared to the Sixth Plan period.

and reservoir characteristics before delineating the total field and designing of permanent facilities.

The conventional system has the disadvantage of having a long gestation period for starting regular production from the newly discovered fields.

Between 1981-82 and now, the overall gas utilisation had gone up from 59 per cent to 75 per cent, they said.

ONGC is trying to improve utilisation by identifying more prospective consumers, particularly in the newly discovered areas like Krishna-Godavari, Rajasthan and the north-eastern sector.

Meanwhile, the feasibility of using compressed natural gas (CNG) as a substitute for vehicular fuels like diesel and gasoline is being studied at four places — Bombay, Rajahmundry, Baroda and Tripura — and the results have been encouraging, they said.

Some of the major gas discoveries in recent years have been Ghotaru in Rajasthan, Agartala Dome in Tripura, Rozale, Narsapur, Tatipaka, Pasalapudi, Bhimnapalli and Kaza in the Krishna-Godavari basin, the sources added.

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9 more rigs for cauveri basin

The ONGC, encouraged by recent successes, has decided to press nine more rigs in the southern region in the next two years in the onland of the Cauvery Basin.

It has at present only four rigs in the basin. The immediate exploratory efforts will include drilling of about 39 exploratory-cum-delineation wells in the next two years, according to ONGC sources.

The real breakthrough in search of oil in the Cauvery Basin, the sources recalled, came in 1985 with the discovery of "sweet oil" at Narimanam structure, followed by a series of successes in Kovilkalappal and Bhuvanagiri structure recently.

Of course before Narimanam, oil was struck at Karaikal in 1964 and the first offshore well was drilled in the Gulf of Mannar in 1977. In 1980 gas was discovered in the PY-1 prospect around Porto Novo and in 1981 in the PH-9 prospect in Palk Bay.

The exploratory drilling in the Cauvery Basin commenced in 1963 and the first well drilled was at Pattukottai. The basin encompasses an area of 25,000 sq. km on and about 23,000 sq. km offshore upto 200 m isobath.

The sources stated the recent successes in Bhuvanagiri-2 has added new enthusiasm for the ONGC to pump in more rigs in the basin. The well here was spudded on July 16, 1987 and was drilled to a depth of 4,795 metres. At present the well is flowing oil at the rate of over 200 barrels and gas at the rate of over 50,000 cubic metres per day.

Yet another factor that seems to have weighed in favour of getting more rigs for the basin is the first-ever discovery in the Ariyalur-Pondicherry sub-basin.

Meanwhile, the ONGC has drawn massive programmes for career planning in the organisation right from the executives down to the staff at the lowest level. For training its technicians and workers, the staff institutes, one each at Bombay, Western Region and Assam, are being set up at a cost of Rs. 7.62 crores. A similar institute already exists in Dehra Dun exclusively for executives.

The focus of the training programmes will be to meet the needs of the

staff in the disciplines like drilling, production, electronics, instrumentation survey, fire-fighting and other oil related vocational trades. In this multiple approach towards training stress is also laid on the upgradation of skills, transfer of technology and development of specialised skills for handling the high-tech areas in the oil business, the sources stated.

The sources added "the net result of this approach is the increase in the level of self-reliance in technology". It has already succeeded in getting rid of foreign services in the area of "directional drilling" and ONGC's own scientists and engineers are now managing the operations independently.

ONGC TO DRILL DEEP IN BENGAL

The ONGC proposed to drill the country's deepest onshore wells in W. Bengal and Bihar.

The targetted depth of each well at Palasi in West Bengal and Ganauli in Bihar is 6,000 metres. BHEL-supplied rigs are being pressed into operation at both the places where drilling is to start soon.

Earlier, ONGC drilled up to a depth of 5,957 metres at Madhubani in Bihar without much success. In West Bengal, the maximum depths drilled so far were at Jaguli (5655 metres) and Diamond Harbour (5555 metres), again with no success. The other sites where ONGC proposes to drill at a target depth of 6,000 metres each are located in Jammu.

Raghubathpur and Domjur, the two Bengal locations where ONGC is currently drilling, have target depths of 5,800 metres each. The drilling at Domjur being undertaken by the American Branham rig will be over soon as 5,146 metres depth has already been reached with no trace of hydrocarbon yet. At Raghubathpur the drilling with the Russian Armco rig has reached the depth of 4,026 metres with no indication of either oil or gas so far.

The target depth of West Bengal offshore wells too is much more than that in other parts of the country. While in Bombay High, hydrocarbon has been struck at a depth of 3,000 to 3,500 metres sometimes even less than that, the drilling of the first well in the Bay of Bengal at a depth of

5,000 metres has yielded no oil. The second well too has a target depth of 5,000 metres of which 3,700 metres have been drilled so far. Drilling of offshore wells is being done on a hired Japanese rig.

The beginning of drilling at Bodra in south 24 Parganas also marks the end of operations at Bodra as the same rig is being moved to Bhasmala. With it also disappears the controversy which surrounded the Bodra well for over two decades.

The drilling at Bodra was started in 1966 with target depth of 5,000 metres. The drilling was abandoned at a depth of 4,198 metres. Subsequently, as the rig was very hopeful of the hydrocarbon potential of the area, drilling was resumed at Bodra (known as Bodra II) in early 1987. The target depth of 5,000 metres was abandoned only a few months after reaching 4951 metres.

On both the occasions, the rig abandoned its operations due to mud loss and terrific high pressure. At Bodra II, first the Russians and then the Americans were asked to tackle the problem. The problem was tackled but no hydrocarbon was struck.

However, the drilling at Bodra has not been an exercise in futility. The experience acquired stood in good stead at Tripura. ONGC also encountered the problem of high pressure. The problem was felt, might also be encountered at Jammu.

(Contd. from p. 38)

March 1979 to Rs. 3,534 crores in October, 1987.

This has to be reduced to Rs. 1,000 per tonne as in the case of oil. This will help reduce the cost of plastic raw materials derived from oil. All these suggestions have been endorsed by the apex body for five-year planning for petrochemical industry headed by Mr. D. V. Joshi.

Unless these suggestions are implemented expeditiously a relief brought to the plastic industry, it is feared, the more processing units will be closed down their units.

This would result not in widespread unemployment and the progress of the plastic industry adds the release.

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2 M.T. crude oil output shortfall likely

Domestic crude oil production is likely to be nearly two million tonnes less than the Seventh Plan target of 159 million tonnes, according to the Planning Commission.

This is mainly because of the shortfall in the eastern region both by the Oil and Natural Gas Commission (ONGC) and Oil India Ltd. due to production problems and pipeline and refining capacity constraints.

The country's dependence on imports of crude and petroleum products is expected to increase to 40 per cent by 1989-90, as against 30 per cent at the beginning of the Seventh Plan.

In its mid-term review, the Planning Commission has called for increased exploration activity.

The Seventh Plan envisaged additional geological reserves of 956 million tonnes of oil and 497 billion cubic metres of gas and recoverable reserves of 235 million tonnes of oil and 331 billion cubic metres of gas.

About 61 per cent of the target in respect of recoverable reserves of oil and 24 per cent of the target in respect of gas has been achieved in the first two years of the Plan.

The total drilling achievement is expected to be 5.30 million metres as against the target of 5.80 million metres. The mobilisation of rigs is behind schedule, but it is partly expected to be made up by drilling efficiency.

The mid-term review has called for greater emphasis on exploration of category II and category III basins for reserve build up during the Eighth and Ninth Plans. It also stressed the need for intensifying seismic surveys and expeditious clearance of the back-log of unprocessed data.

Most gas development programmes are behind schedule and there have been considerable slippages in commissioning many platforms in Bombay High, according to the review. Cambay Basin project is also likely to be affected.

The availability of LPG during the terminal year of the Plan is estimated at 1.87 million tonnes as against the target of 2.54 million tonnes. The shortfall is on account of non-implementation of fractionation plants in

Madhya Pradesh, Rajasthan and UP

along the HBJ pipeline during the Plan.

The total demand for petroleum products by 1989-90, is expected to be 52.7 million tonnes, the same as estimated at the time of formulating the Plan.

The Seventh Plan postulated a growth rate of 6.4 per cent in the consumption of petroleum products. In the first two years of the Plan, the average growth rate was only 5.8 per cent.

However, in the current financial year, the growth rate is likely to be seven per cent particularly because of the need to activate agricultural pump-sets following drought conditions, according to the review.

While the consumption of middle and heavy distillates continues to maintain the past trend, light distillates consumption is spurting. In 1986-87, LPG consumption grew by almost 21 per cent and that of petrol by 10 per cent. The projected growth rate for LPG and petrol during 1988-89 are 14 per cent and 13 per cent respectively.

The Planning Commission has called for greater and renewed emphasis on expansion of public transport system in urban areas to restrain the use of personalised transport.

It has also called for a campaign to curb the growing demand for kerosene and diesel, most of which is imported.

With the addition of 8.50 million tonnes in the Seventh Plan, the total refining capacity was expected to reach 54.05 million tonnes by 1989-90.

However, the total refining capacity is expected to reach only 51.85 million tonnes, mainly due to the non-implementation of the expansion of the Bongaigaon refinery.

HBJ PIPELINE: NO GAS FOR TAKERS

Not much gas has passed through the HBJ pipeline ever since the Gas Authority of India Limited (GAIL) started its no-takers-for-gas campaign. It is now being made to eat its own words for there is no gas for takers.

Two public sector fertiliser plants along the pipeline, one at Bijapur and the other at Aonla, are all set to use gas. It is learnt that while gas is being made available to the Bijapur

plant, it is at a pressure less required leading to underutilisation of plant capacity.

The Aonla fertiliser plant of Indian Farmers' Fertiliser Co. (IFFCO) was also ready on Jan 1 for beginning gas consumption. However, the plant authorities have told that gas will not be available for another three months now.

GAIL has been crying hoarsely about the delay in the commissioning of fertiliser plants along the pipeline. This delay would result in a loss of Rs. 50 lakhs per day in revenue. Though the three private gas-based fertiliser projects—Madhopur (Aravali Fertilisers), (Tatas) and Shahjahanpur (Fertiliser) are running behind schedule, the question being asked in the concerned ministry is why the plants which are ready to take gas are not supplied with it?

In fact, GAIL has gone overboard to prepare alternative plans to utilise gas from the pipeline for purposes other than fertiliser manufacture. It has toyed with the idea of using LPG from the gas as also producing petrochemicals.

GAIL had also drawn up plans to locate additional consumers so that the pipeline is utilised to the maximum extent possible.

It was also proposed to supply gas temporarily to GSFC and during such time as the fertiliser plants are set up. In addition, other consumers like Indian Explosives Limited, the Thermal Power Corporation, Delhi Electricity Supply Undertaking were identified as potential users of the excess gas.

There was even a proposal for extension of the pipeline up to Dadri in UP and the laying of a spur line from the main HBJ pipeline. GAIL had estimated an additional cost of Rs. 110 crores for this.

EXPORT OF IODISED SALT ALLOWED

The commerce ministry has agreed to the export of iodised salt (for human consumption) without a fixed ceiling on "first-come, first-served" basis.

A public notice issued by the controller of imports and exports on January 15 said that the export of iodised salt has been permitted "on a review basis".

Carbide plant was to be dismantled before gas leak

Union Carbide had decided to close its factory at Bhopal three months before it leaked a poisonous gas which killed more than 2500 people in the worst industrial tragedy in December 1984.

The company wanted to export the plant to Brazil and Indonesia, but the Union Carbide India Ltd. (UCIL) kept its headquarters that the dismantling and shipment would be a problem because of the high corrosion at various points and some tall chimneys which may need some work at the time of dismantling. The decision to dismantle was taken on November 13 and the tragedy occurred on December 2.

The lessons of a tragedy were revealed in a new book by an Indian journalist Sanjoy Hazarika. In their own unambiguous language, the managers of Carbide were exposing their duplicity. On the one hand they claimed the plant was in top shape. But on the other, they admitted especially to their bosses — "things were seriously wrong and urgent repairs", the author

reveals. The main safety audit of the Bhopal plant was done in 1982 when ten major defects were located. But there was no independent survey between then and the accident to check claims that the major dangers had been tackled. Linking the close links between the multinational Union Carbide and its Indian unit the author says the safety plans for three critical systems — the gas scrubber, the flare tower and the water spray — came from the parent company. The technical manuals for the factory were based on originals issued by Union Carbide Corporation, the author says.

The 1982 safety audit report prepared by a six-member expert team led by Dr. P. S. Pouson had expressed a major concern that there was the potential for a runaway reaction in unit storage due to a combination of several factors — high temperature and reduced surveillance. A major worry was the chance that the plant workers could be seriously exposed to chloroform a byproduct of the reaction.

The report was "business confidential," the author says, which was submitted to Mr. B.

D. Mollownay, deputy manager at the Institut plant, spoke of the various possibilities that could cause a runaway reaction. The combination of water and catalyst contamination possibilities, reduced surveillance, increased residence time and an experience-based low level of concern toward the potential hazard led the team to conclude that a real potential for a serious incident existed.

This report and other confidential information were taken out of the internal correspondence, dated September 11, 1984, between the engineering and technology services, central engineering department, safety health group and the Union Carbide Corporation.

Pointing out the lack and delay of compensation the author says "Because of the tardiness of the arrival at an understanding between the government and Carbide, a reborn Bhopal is still distant."

In the chapter on "The lessons of the tragedy," the author suggests a code of conduct for multinationals, banning

of population centres around toxic industrial units and strict enforcement of safety standards by the government.

On Carbide's sabotage theory the book says: "This is essentially a simplistic explanation. It does not explain lack of crisis preparedness on the part of other workers (who are not saboteurs), it does not brush away the malfunctioning or ineffectiveness of key accident inhibitors, it does not exculpate the company on points of inadequate safeguards and warning systems. On all these points Carbide cannot avoid its responsibility".

Hazarika says neither New Delhi nor Bhopal "can avoid charges against them however hard they try". The book holds Madhya Pradesh administration responsible on 13 counts.

It says the plant was declared safe by the labour minister after a worker died of phosgene leak and the state government "is directly culpable for permitting and encouraging slum dwellers to settle next to the plant."

"The government did nothing about the encroachments, it allowed the migrants to stay, put in electricity and water lines and finally legalised the colonies."

— Courtesy: The Economic Times

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Union carbide appeals against order on interim relief

The Union Carbide Corporation (UCC) filed an appeal in the Madhya Pradesh High Court in Jabalpur against the order of the Bhopal District Court regarding payment of interim relief to the victims of the Bhopal gas tragedy.

The Court had fixed January 21 for hearing the case.

The Bhopal court on December 17 last had ordered the UCC to pay Rs. 350 crores as interim relief to the victims of the gas leak disaster at Carbide's Bhopal plant that killed more than 2,000 people.

The Bhopal Court had also ordered that the interim relief amount be deposited within two months. More than half a million people have filed claims for compensation.

Decree without trial

Announcing its decision to appeal, Union Carbide said in a statement released in New York that the order for interim compensation "amounts to a judgement and decree without trial — judgement without evidence, judgement without considering the defences of Union Carbide Corpn. or the merits of its countersuit against the Indian Government."

The statement charged that the Court order introduced "a new and unenforceable concept of law."

India had earlier filed a civil suit against Union Carbide for \$3.3 billions in damages over the leak of poison gas.

The company claims the tragedy was the result of sabotage by a disgruntled employee at the plant, owned by Union Carbide India Ltd., in which the Indian Government is a shareholder.

In its statement, the company said it was "committed to helping the victims but that help cannot be achieved without due process of law stipulated by United States courts. Interim compensation cruelly raises unachievable expectations in the people of Bhopal."

It said its lawyers were "confident that sabotage at Bhopal will be proven in the course of a fair trial."

"Under conventional legal theories," it added, "that would exonerate the Corporation, making interim compensation not only wrong but inappropriate".

The statement said the Bhopal Judge who ordered the compensation payments had acknowledged that this move was "without legal precedent in the entire field of court law".

LOAN LICENSING OF DRUGS TO GO

The government has decided to discontinue the system of loan licensing in drug industry. An amendment to the drugs and cosmetics rules 1945 omitting all provisions relating to loan licensing has been proposed by the Union ministry of health and family planning.

The decision to discontinue the 10-year-old system is in pursuance of objectives of the new drug policy announced in December 1986. The government has given 60 days for submission of any objections or suggestions on the proposed amendment.

According to informed sources, the Centre has directed all the state and drug administrations to implement the amendment. The loan licences issued by the state FDAs for a period of two years and renewed thereafter at their discretion.

One of the conditions which are supposed to monitor after loan licences is that the licensee should set up his own manufacturing facility in a period of two years. Over, this condition is usually ignored by all FDAs and licencees are given renewals.

The health ministry has been contemplating abolition of loan licensing in drug industry for long in the text of the general impression leads to generation of spurious substandard drugs and medicines.

An immediate outcome of the government decision will be cancellation of over 8,000 loan licences in the country. There are more than 10,000 loan licences operating in Maharashtra alone.

The decision is also expected to render thousands of people unemployed throughout the country, besides creating huge idle capacities in the industry.

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CHEMICALS, DRUGS EXPORTS:

Target may be exceeded

Export of basic chemicals, pharmaceuticals and cosmetics will exceed the target of Rs. 1,000 crore for the terminal year of the Plan (1989-90) according to the chairman of the Basic Chemicals and Chemicals Promotion Council (Chemexil), S. Deora.

Deora said a team of Delhi-based correspondents in Bombay reported the export of items handled by the council could even touch a mark of Rs. 5,000 crore by the end of the century if the government provides 'proper assistance'.

Discussions with certain exporting firms around Bombay revealed that exports could be given a major boost in the coming years if the basic materials — benzene, naphthalene and xylene — are made available by the government at inter-vening prices.

Deora said the government should provide cash compensatory (CCS) drawback rates to help the exporters, as they pointed out.

The adequate availability of these materials at reasonable prices, reduction in the manufacture of drugs, pharmaceuticals, chemicals and agro-chemicals can help exporters improve their performance in the years ahead. Advanced countries are curbing the production of chemicals and aware of their pollution effect, exporters are likely to produce quality goods and sell the same abroad, thus maximising foreign exchange earnings.

The council chairman is confident of exceeding this year's target of Rs. 1,000 crore. The target represented an increase of 38 per cent over the previous year's actual level of Rs. 562 crore.

Deora complained of differences between the Union ministries of chemicals, pharmaceuticals and commerce, which is resulting in delay in decision making. For instance, CCS on a significant item — agarbathis — has been drawn along with medicines in August 1986. Lack of cost data. Despite reports, the council has failed to get it restored.

Agarbathis, being employment oriented, fetch foreign exchange worth Rs. 600 crore. As a result Pakistan and other countries are replacing India in world markets.

Another demand relates to supply of power and fuel at international prices for the export products of the chemical and petrochemical industries, because these are power-intensive. Such a decision will be of "great assistance and exports will increase," said a leading exporter.

The small-scale sector presently accounts for a lion's share in the export of items handled by Chemexil. Of the total export earnings, small-scale units account for as much as 60 per cent. In view of their impressive performance, the government should come out with more incentives, the visiting newsmen were told.

Mr. Deora said that there was "tremendous" scope for increasing exports of bulk drugs and pharmaceuticals to a number of countries such as the US, South Korea and Japan.

He wanted the small-scale limit to be increased to at least Rs. 50 lakhs from the present ceiling of Rs. 35 lakhs as the cost of capital equipment has gone up considerably.

Most of the exporters complained that instructions issued by Union ministries are not properly followed at the lower level. Moreover, decisions announced in principle are not implemented for quite some time.

In this context they cited the instance of the announcement made by former commerce secretary, Prem Kumar on September 30, 1987, saying that units exporting 25 per cent or more of their production, and having captive power generation sets, would be supplied diesel at rates close to international prices. Although more than three months have passed, no notification has been issued by the Union finance ministry so far.

The Chemexil chief strongly demanded that the government should treat those units which fetch sizeable foreign exchange and those which earn marginal exchange on a different footing. He wanted the repeat facility of supplementary licences given under para 84 of the import-export policy.

The council is coming out with a directory of 159 plants of common use in India for circulation in important international markets because these ayurvedic plants have considerable export potential.

Mr. Romanlal V. Shah, chairman cum-managing director, Eupharma Laboratories said emphatically: "If the exporters work within the parameters of policy and fill up the prescribed forms completely, there can be only some delay." His company recently opened an office in London from where it would be possible to supply items off-the-shelf to foreign buyers.

A spokesman of Excel Industries wanted facilities to be given by the Union government to encourage export of free samples for pesticides, which is considered a pre-requisite if pesticides were to be exported. Export of agro-chemicals is placed around Rs. 45 crore annually.

Mr. Govind D. Kelkar, managing director, S.H. Kelkar and Company, informed the correspondents that perfumes were no longer a luxury and are thus widely used in the manufacture of soap, toothpaste and agarbathis besides toiletry items. There is considerable scope for exporting these items to south-east and west Asian countries in particular.

G. Amphray Laboratories has drawn up an export plan to maximise foreign exchange earnings with suggested incentives. The company exports bulk drugs like paracetamol.

RCF TROMBAY UNIT BAGS AWARD

The Trombay unit of the Rashtriya Chemicals & Fertilizers Ltd. has been given the Productivity Award for the year 1986-87 by the National Productivity Council.

The award was received by the Unit's General Manager, Mr. U. N. Nayak, two executives and two office-bearers of the recognised Union, at the hands of the President of India, at a function organised at Vigyan Bhavan.

This award comes in recognition of RCF's best operational performance during the year and its innovative efforts in environmental protection.

The Trombay plants of RCF manufacture all the three types of fertilizers (nitrogenous, phosphatic and potassic) and vital industrial chemicals.



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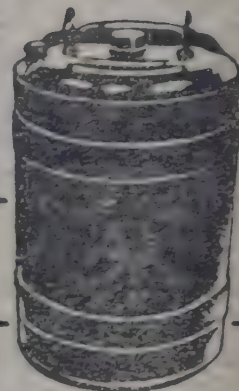
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plan to manufacture advanced engg. plastics

Petrochemicals Corporation has decided to enter a new manufacturing a variety of advanced engineering plastics at an estimated cost of Rs. 230 crores.

The investment capital would be provided by IPCL from its internal resources and no recourse to budgetary support. The project would be implemented by the end of 1988.

The company has already submitted an application to the Government seeking a licence for manufacture of such plastics. Simultaneously, it has signed a memorandum of understanding with General Electric Plastics, a wholly owned subsidiary of General Electric Company, to evaluate the feasibility of setting up a joint venture in the manufacture of engineering plastics.

The memorandum of understanding envisages the possibility of the company setting up a dedicated development centre, facilities and eventual resin production of polycarbonate and polyphenylene oxide.

Initially, IPCL would be setting up a joint venture with the Dutch company to manufacture these advanced plastics. Already, IPCL has entered into an agreement with General Electric to market its entire range of engineering plastics and polycarbonate film products in India from the end of 1988.

The company has been sought for licence to manufacture of four items in the following brackets: Coloured and composite and special products of advanced engineering plastics (5,000 tonnes per annum) as well as coloured and composite sheets (25,000 tonnes per annum), modified polyphenylene oxide (10,000 tonnes per annum) and polycarbonate (15,000 tonnes per annum).

The management has told the company that it would locate the development centre, composite plant and the sheet plant at the existing Baroda in the first phase. It would be done to take advantage of the company's existing location of the Baroda and the strong infras-

structure facilities backed by proven product application and research and development application.

The first phase would be followed by setting up of major production units for the manufacture of polycarbonate and polyphenylene oxide at a grass-roots location in the eastern coast. This will ensure dispersal of the engineering plastics industry with facilities for tackling environmental problems.

IPCL has been examining the possibility of manufacturing engineering plastics used in electronic, automobile,

telecommunication and electrical goods industries. For some time, in view of the need for such advanced materials in the country, it decided to manufacture these advanced engineering plastics after an international seminar on performance plastics underlined the need for such steps.

The management of IPCL is of the view that its long production expertise and safe operating experience in handling a variety of complex technologies make it the most preferred company for manufacture of polycarbonate zinc phosphene. It has also deliberately kept the capacities at substantial levels in view of the future requirement of these products in the country.

Commodity plastics scarce

The scarcity and high prices of basic plastic materials, namely low density polyethylene, high density polyethylene, PVC etc. continues in the country despite the reduction of import duty on all major commodity plastics allowed by the government in September last. The decision to cut the customs duty was taken in the context of a steady rise in the prices of commodity plastics in the international market. Imports of most of these plastics had come down sharply during the middle of last year.

The reduction in the duty had helped the plastic processing units to procure the raw materials from the world markets for some time. The situation has now changed with a further flare-up in the prices of plastics neutralising the effect of the duty reduction. For instance, HDPE, used for making woven sacks, containers, house hold items, etc., is being quoted at \$1,200 a tonne now in the world market, whereas the price was only about \$900 a few weeks ago. Industry sources feel that prices in the world market are likely to go up further in the coming months.

The rising trend in HDPE prices in the world market is stated to be one of the reasons for the scarcity situation in India. The market price of HDPE has now shot up to Rs. 30,000 a tonne which was only Rs. 21,000 two months ago. The only manufacturer of HDPE in the country — Polyolefins Industries Ltd. — hiked the price of HDPE to Rs. 26,000 a tonne

a few days ago. The company justified it by saying that prices of several inputs had gone up during the last one year.

In the case of PVC, the international price has moved up to touch \$1,100 a tonne which was around \$800 a few weeks ago. A number of plastics processing units are finding it difficult to run their factories as they would not be able to market the products at correspondingly higher prices.

The current international price for low density polyethylene is stated to be \$1000 a tonne as against \$800 some weeks ago.

Industry sources in Bombay point out that the uptrend in the prices of commodity plastics is likely to continue in the coming months also as there is an all-round decline in production of commodity plastics in the world because of the closure of some petrochemical units in Europe. As the domestic demand for commodity plastics continues to increase and the indigenous production of these materials is far below requirements, the sources feel that the government should further reduce the customs duty to improve the availability of these raw materials for the processing industry.

According to a recent study made by the Indian Plastics Institute, consumption of commodity plastics such as LDPE, HDPE, PVC resin, polypropylene etc. is expected to grow from a modest 4,92,000 tonnes in 1985 to 24,40,000 tonnes by the end of the century.

GFCL bids for ammonia, urea plant in AP.

Godavari Fertilisers and Chemicals Ltd (GFCL), the joint sector public limited company promoted by the Andhra Pradesh government and Indian Farmers Fertiliser Cooperative Ltd (IFFCO) which recently commissioned a Rs. 108 crore di-ammonium phosphate (DAP) plant at Kakinada, has applied for a letter of intent to the Centre to set up an ammonia and urea plant in the state.

The plant, with an envisaged capacity of 1350 TPD, is proposed to be sited in either East or West Godavari district or in Krishna district.

According to Mr. M. Gopalakrishna, GFCL managing director, the company has all the infrastructural facilities for a large ammonia and urea plant as also access to natural gas available in the Godavari and Krishna basins. The company had decided to go in for the plant in the light of the announcement made by the minister for fertilisers, Mr. R. Prabhu, to the effect that, henceforth, the Government of India's policy would be to locate urea plants in areas where raw materials as also market facilities are readily available.

Further, the Dr. N. Bhanu Prasad Committee which was appointed to examine the scope for the utilisation of natural gas, recommended that the state government of the Centre give priority to the deployment of natural gas in the creation of new fertiliser capacities in the state.

The company is encouraged to blueprint ambitious expansion schemes in

the wake of its success in commissioning its DAP plant in Kakinada, with a capacity of three lakh tonnes per annum within a record period of 26 months — well within schedule and budgets.

According to Mr. Gopalakrishna, GFCL is equipped to market an estimated six lakh tonnes of fertilisers — three lakh tonnes of DAP and an equal quantity of urea. The company is currently working on a one-stop-shop concept and plans to retail, in addition to DAP, other agricultural inputs such as zinc sulphate, sulphate potash, muriate of potash, calcium ammonium nitrate and ammonia sulphate under the Godavari brand.

The company has entered into a tie-up covering the supply of ammonium sulphate with the Steel Authority of India (SAIL) and is also purchasing urea from RCF and FCI in Ramagundam. Prior to the commissioning of its plant, GFCL was purchasing DAP from Paradeep Phosphates Ltd. as also importing the fertiliser through the Kakinada Port. The company is currently negotiating the purchase of zinc sulphate from a short-list of two or three companies.

The other components of the corporate plan comprise of a move to market pesticides through its network, the supply of certified seeds to farmers and the sale of agricultural implements such as sprayers, dusters, fillers and tractors through GFCL dealers.

The company management holds that its proposed urea plant will be en-

tirely viable in that there is a shortage of the fertiliser in the state with only 20 per cent of the demand met by units within Andhra Pradesh.

The company is currently exploring the possibility of tapping the number of by-products that are to be generated when the Visakhapatnam Steel Plant goes on stream.

RECORD UREA DESPATCHES BY KRIBHCO

Krishak Bharati Co-operative (KRIBHCO), achieved an all-time record in despatches by moving over one lakh tonnes of urea during December 1987 from its Hazira plant in Gujarat.

This represents the highest urea despatches in a single month not only for KRIBHCO but for the entire fertiliser industry in the country, as pointed out by Dr. K. K. S. Chauhan, KRIBHCO Director.

Ninety per cent of record urea despatched was moved by rail and the rest by the road. The single day highest despatch of 9,979 tonnes was also achieved on December 1, 1987.

Ammonia production of 14,400 tonnes, the highest for any single day, and a single-phase was achieved on December 23, 1987, which represents 108 per cent of its rated capacity.

During December 1987, urea production of 1,41,728 tonnes was achieved, which represents 117 per cent of the rated capacity — the second highest since inception of commercial production at the plant in a single month.

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LAB FOR SALE?

Piramals, Goenka group in race

ge industrial houses, names of Morarjee Mills and the ka group of Calcutta are in to acquire controlling interest s Laboratories Ltd., a manu- analgesic Aspro and other tical products, writes Anil Times.

s made by these two houses currently evaluated by ANB Australia operating in London, gained by the Aspro-Nicholas U.F., which holds 39.5 equity in the Indian Asso- ultimate holding company atian multinational, Nicholas al, holder of the registered ks of Aspro and allied pro-

months ago, Reckitt and India Limited, of Calcutta sed to take-over controlling the Nicholas Laboratories. al could not go through as ment of Reckitt and Cole- second thoughts, felt that the of Nicholas Laboratories may very profitable in view of aints on the drug prices un- w drug price control order.

amal bid for acquiring the reholding in Nicholas is said and reasonable and in line uidelines laid down by the ank for the transfer of alien gs in the Indian companies. ramals have been wanting to cholas for quite some time. are that the final outcome Piramals' favour.

posal of Goenkas, it is un- is linked to certain condi- the fulfilment of liability, if g out of any adverse impact plications of drugs produced s. Such conditions, it is not being accepted by the multinational.

some of the Goenka group are facing excise problems fore, the authorities do not e inclined to favour Goenkas. d.

be noted that some of the es taken over by the G.P. roup are in a bad shape. Na- on Corporation, for instance,

which was taken over by the G. P. Goenka Group, a couple of years ago, has been incurring huge losses. Star Paper, a sick paper mill recently taken over by the Goenka Group, is proposed to be merged with Bakelite Hylam to improve its prospects. But, such a merger is being opposed by several shareholders as it would affect the fortunes of Bakelite Hylam.

According to reliable sources, the Piramal bid is for acquiring the Rs. 10 paid-up shares of Nicholas around the current market value of around Rs. 50. This price level is said to be around the price that could be fixed by the Reserve Bank based on the break-up market value and earning capacity of the company.

Nicholas Laboratories, which was incorporated in April 1947, manufactures pharmaceuticals and consumer products at its factory at Deonar, near Bombay. The company is famous for

analgesic "Aspro" and the fairness cream 'Cleartone'.

The company, which suffered a setback during 1985-86 partly on account of the labour trouble and partly on account of the uneconomic drug prices, has staged a recovery during 1986-87. Its turnover increased to Rs. 17.55 crores during the year ended June 30, 1987, from Rs. 16 crores in the previous year. The gross profit showed a marked rise to Rs. 1.09 crores from Rs. 38 lakhs in the previous year. The company has raised the dividend to 18 per cent from 15 per cent paid for 1985-86.

The company's equity capital amounts to Rs. 1.46 crores. Of this, 39.5 per cent is held by the foreign collaborators. Its reserves totalled Rs. 1.90 crores at the end of June 1987. The book value is around Rs. 23 per share.

The Rs. 10 paid-up Nicholas shares have been a firm feature in the past few days with the quotation moving up from Rs. 45 to Rs. 58.

The company's current working is said to be quite encouraging.

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SCIENTIFIC RESEARCH:

Sharper focus on specific areas urged

While all frontiers in science and technology might not be relevant to India, the need for building up a cohesive force to make a significant breakthrough in specific areas like metallurgy was stressed by Dr. Vasant Gowariker, secretary, department of science and technology.

Speaking on government programmes at the 75th Indian Science Congress at Pune, Dr. Gowariker said metallurgists have to be given a new mandate, as Indian steel was one of the costliest in the world.

Dr. Gowariker, who detailed the programmes of the department of science and technology, said the research funding itself was estimated at nearly Rs. 50 crores, of which universities alone received a staggering Rs. 10 crores yearly. In small industries, there were no serious problems regarding transfer of technology or research funding, but the heavy industries posed a major challenge, he pointed out giving yet another example of internal combustion engines, which had great relevance in the automobile industry.

Atomic Energy Commission chairman Dr. M. R. Srinivasan said the department store approach to research had to be given up in favour of specialised research in areas of relevance. Within the diversity achieved, a sharper focus was necessary.

Dr. Srinivasan said the commercial use of nuclear power could revolutionise economic activity in the country. Nuclear scientists had also manufactured superconducting wires using rare earths and strips of ceramic materials in a newly emerging area of high technology.

Responding to a question during his presentation over the alleged stranglehold of the atomic energy department over biotechnology research, Dr. Srinivasan said a board had been set up for radiation and isotope technology in the country in order to make isotopes readily available to researchers.

He also advocated higher stress on fundamental research and disclosed that the national board of higher mathematics had decided to set up a new centre in Delhi.

The Atomic Energy Commission chairman reiterated that the Indian programme was totally peaceful. The policy would continue to be the same, he said.

Referring to the inhouse technology used to build the variable energy cyclotron at Calcutta, Dr. Srinivasan said the completion of this project took much longer than anticipated. The Indian expertise had improved manyfold with adequate support from the industry through meaningful transfer of technology.

Regarding the repairs being conducted at the Rajasthan Atomic Power Station (RAPS), Dr. Srinivasan said the cost benefit of undertaking further repairs was being considered. RAPS I, which developed an end-shield defect, was working but not to its full capacity.

The country also had heavy cranes to lift huge reactor parts and it could further manipulate placing of these parts in minute precision.

In order to achieve generation of 10,000 mwe by 2000, design work had been completed on the 500 mwe fast reactor using mixed carbide of uranium and plutonium and the first of these reactors would be ready by 1977. More such reactors would be built, in addition to smaller reactors of 235 mwe capacity to boost the nuclear power capacity, he added.

Mr. Maheshwar Dayal, secretary in the department of non-conventional sources of energy, said a whole range of scientific disciplines were being pursued to harness alternative sources of energy and integrate them meaningfully.

Mr. Dayal said new technologies should be judged in terms of the pay-back period and their contribution to preserve the environment and improve the quality of life in rural and urban areas.

He said gigantic efforts would be needed to organise production, transportation, refining and distribution of huge quantities of fossil. The country's annual coal and oil requirement by the turn of the century would touch 53 million tonnes and 92.7 million tonnes respectively. On the power front, the

requirement was over 500 b by 2001-5 against 150 b at present, he added.

Dr. S. Ramachandran, secretary, department of biotechnology, the "technology mission" set by the Prime Minister, was aiming the country self-reliant in oils and reduce imports as possible.

The mission would give rise genetically identical clones of high-yielding coco-palms through somatic embryogenesis towards in vitro and protoplast fusion, he said.

Dr. Ramachandran further plans to undertake production of vaccines. The mission aimed modernisation and expansion in existing units, evaluation of vaccines, standardisation and quality control, besides developing alternative vaccines for fertility and immunological approaches.

Safety guidelines had been evolved to monitor the effects of biological techniques and procedures involving recombinant DNA technology.

HFC's BARAUNI UNIT TURNS CORNER

Barauni unit of Hindustan Corporation (HFC), has turned corner and improved the capacity to 81 per cent, cut all-India average by 11 per cent.

The unit which at one time proposed to be closed, produced 24,297 tonnes of urea in last month.

On the last day of 1980, the unit broke all previous records and produced 1,166 tonnes as against the designed capacity of 1,000 tonnes per day.

It has improved its performance in the despatch field too, having despatched 36,460 tonnes of urea in last month which was a new monthly record.

According to an official statement, no other HEC unit has despatched urea in any single month since 1975.

The unit also created a new record with despatch of 2,613 tonnes of urea on December 21 last.

The other units of HFC are at Namrup (Assam) and Raniganj (West Bengal).

a rapid wrap-up of what's new in operations, processes & products

chemical reduction of 4-cyanopyridine

ar have operated an electrochemical process to convert the title compound to the corresponding amine. This route seems to be superior to the catalytic process. A filter-press flow cell with a cation exchange membrane divider and Pb electrodes has been used. (*Membrane Sep. Tech. News*, 1985, 4(4), 12, Cf. *Chemtech.*, 1987, 11(6), 66).

hydrogen peroxide from H₂ and O₂

It has been claimed a new manufacturing process for hydrogen peroxide which is delightfully simple and based on H₂ and O₂ only. The key step in this novel process is the use of a novel catalyst. (*Chem. Mkg. Rep.*, 1987, 7th ed., 4).

hydrogenation of aromatic hydrocarbons with aq. H₂O₂

K. I. Iwata and Y. Sasson have shown that bromination of aromatic hydrocarbons in a two-phase system with aq. HBr and H₂O₂ is promoted by quaternary ammonium salts which function both as catalysts and as phase transfer catalysts (for compounds like phenols/anilines we do not need Lewis acids). For benzene, toluene, ethyl benzene, chloro benzene etc. this new strategy works well. (*J. C.S. Chem. Commun.*, 1987, No. 19, 1421.)

chlorination of polyethylene

It has been claimed that chlorination of aqueous suspensions of polyethylene particles (40 mesh) can be conveniently carried out at temperatures below 100°C (pressure 2.3 atm), in the presence of a small amount of polyvinyl alcohol. (*Chem. Abstr.*, 1987, 102, 156039).

dimethyl phosphate (DAP) manufacture in continuous reactors

DAP can be made, without solvents, in a two reactor system. In the first spray reactor the corresponding alcohol is reacted with an excess of PCl₃. In the second continuous column reactor the reaction is

completed with a 70-200 mole % alcohol excess. (*Chem. Abstr.*, 1987, 107, 156954).

Di-tert butyl ethylene diamine (DTBEDA)

The title compound has been made by reaction between *tert* butylamine and aqueous 40% glyoxal in a two-phase system with octane as solvent. Subsequent hydrogenation, with 5% Pd/C of the hydrocarbon phase converts the diimine to the diamine. It is claimed that 80% yield of the diamine of 98.5% purity can be realised. (BASF, Ger. Offen. DE 3,602,527, *Chem. Abstr.*, 1987, 107, 197533).

2,6 Dichloro-4-nitroaniline

The chlorination of 4 nitroaniline with chlorine in aqueous HCl can be carried out with high selectivity to give the title compound in the presence of ligninsulfonic acid or its salts and/or dialkyl sulfosuccinates. Thus with the additive the yield of the title compound was 96.3% compared to 77.4% without the additive. (Himenko, K. et al., Jpn. Pat., 6270,345, Cf. *Chem. Abstr.*, 1987, 107, 1997707).

2,2' Dinitrobenzyl

The title compound useful as an intermediate for pharmaceuticals and resins can be made by air oxidation of 2-nitrotoluene, dissolved in decane, and in the presence of NaOEt. (*Chem. Abstr.*, 1987, 107, 197771).

3 Alkyl-4-halophenols

It has been claimed that the chlorination of meta-cresol dissolved in chloroform and in the presence of Fe (CO)₅, with SO₂Cl₂, gives about 85% of the desired isomer and about 12% of 2-chloro-5 methyl phenol. (Awano, Y. et al., Jpn. Pat. 6281,342. Cf. *Chem. Abstr.*, 1987, 107, 197780).

Bisphenols

Kondo, M. et. al., have claimed that 2,6 xlenol can be oxidised with Mn (OAc)₂ 4 H₂O in DMF with air at 150°C to give 62% 3,3',5,5'-tetramethyl-4,4'-dihydroxy-biphenyl. (Jpn. Pat. 6277,341. Cf. *Chem. Abstr.*, 1987, 107, 197781).

Phenylacrylic acids and phenyl-2-hydroxy propionic acid

Machara, K. and co-workers have claimed that p -Me₂CH CH₂C₆H₄CO₂H can be reacted with chloroform, aq. KOH, in the presence of benzyltriethylammonium chloride, to give a 4:6 mixture of R C₆H₄C(=CH₂) COOH and R C₆H₄C(OH) (CH₃) COOH. (Jpn. Pat. 6281,348, Cf. *Chem. Abstr.*, 1987, 107, 197798).

Glycolamides as herbicides

Bayer have claimed that amides of chloroacetic acid, e.g. ClCH₂CONPr₂ can be reacted with K₂CO₃ and Et₃N in DMF medium at 100°C and subsequently with KOH/MeOH to give HOCH₂CONPr₂ in 80% yield. (Ger. Offen. 3,539,394 of May 87, *Chem. Abstr.*, 1987, 107, 133909).

Purification of glycerol

Shell have claimed that supercritical CO₂ can purify synthetic glycerol to free it from acetals and/or ketals. (U.S.P. 4,683,347, July 1987, *Chem. Abstr.*, 1987, 107, 117358).

Alpha-olefins from light olefins

Mobil have claimed that lower alpha olefins can be passed over zeolites like HZSM-5 to give higher alpha olefins. This can be combined with metathesis to get olefins of desired carbon number. The process is claimed to give C₉₋₁₈ alpha olefins in high yields. (U.S.P. 4,655,245, May 1987, *Chem. Abstr.*, 1987, 107, 117344).

Phenylacetaldehyde (PA) from styrene oxide

Styrene oxide, in a medium of high boiling solvent like liquid paraffin, with powdered Al₂O₃ and SiO₂ catalyst, in a continuous reactor-distillation system gives high quality PA in 92.5% yield. (*Chem. Abstr.*, 1987, 107, 117332).

Water-gas (low temperature) conversion : Chlorine resistant catalyst

Shell have claimed that a catalyst based on Cu, Zn, a rare earth element, and 5-30% of an alkaline earth element, shows a high resistance to Cl poisoning. A typical composition is Cu-42%, Zn-26%, Lu-3.3% and Co-7.2%. (U.S.P. 4,683,218, July 1987, *Chem. Abstr.*, 1987, 107, 15786).

Reaction between COS and alkenes

Dunkerton and Sasa have shown that F catalyses the reaction under reference. Thionene gives 4-methyl-beta-methylene-3-hexene-1-propanthioic acid. (*Sy. Commun.*, 17, (10), 1217).

Cross-Cannizzaro reaction (CCR) : *m*-phenyl benzyl alcohol (MPBA)

Sane and Sharma have shown that PEG 20 only intensifies the two-phase reaction of phenoxyl benzaldehyde with aq. HCHO but makes it more selective for the CCR giving than 75% yield of MPBA. In the absence of the reaction is essentially CR giving MPBA yield around 50%. This is a unique observation. (*Commun.*, 1987, 17, (11), 1331).

World of polymers -- Newer Developments

Dr. S. Ganguly, (CMD, IPCL) has given an analysis of this subject in the 23rd Founder Memorial Lecture of Shri Ram Institute in April 1987 published in *J. Sci. Ind. Res.* (1987, 46, 145). He has ably surveyed the scenario of 70's and globally and given his perceptions in coming years for thermoplastics, thermosets, engineering plastics etc. He has rightly emphasised the importance of basic research and having schools of excellence. His paper concludes with "The future scene of world of polymers in India is full of promise and excitement".

Free-radical polymerization of methyl methacrylate (MMA) : PTC

Choi and Lee have studied the kinetics of water-soluble potassium peroxydisulphate initiator based polymerization of MMA; macrocyclic poly(18-crown-6) was used as PTC. The PTC based polymerization gave considerably higher molecular weight and more-uniform mol. wt. distribution than by the conventional organic initiators like azobutyronitrile. Bulk polymerization, in the absence of water, but with PTC, can also be conducted. (*Eng. Chem. Res.*, 1987, 26, 2079).

Separation of diethylbenzene (DEB) by some column adsorption

Lu and Lee have shown that zeolites, X, Y, 5, and DZ and their ion-exchanged forms

in separating isomers of DEB and CDZ zeolites seems to be most appropriate at 120-190°C. DEB is commonly used as a desorbent in the EX process for pure p-xylene. (*Ind. Eng. Chem.*, 1987, 26, 2024).

phenols

Ards et. al. (of Courtaulds Res, U.K.) have discussed merits of different routes for making thiophenes (e.g. benzene sulphonic acid + P; p-toluene thionyl chloride with Zn + acid; phenol + S_2Cl_2 subsequent reductions etc.). Now Courtaulds have developed a new process based on phenols. The reaction is between phenolic substances and thiophenols based on phenol, cresol and xylenol has been covered. The utility of thiophenols in agrochemicals and pharmaceuticals has been discussed. (*Speciality Chem.*, 1986, Oct.).

Supercritical fluids (SCF) find critical mass

Spalding has given a nice account of this subject which in early eighties was touted as a panacea. SCF are commercially used for the removal of caffeine from coffee beans, bittering agents from hops, etc. This process is capital intensive and thus not suited for expensive chemicals/substances. An interesting promising example is the removal of cholesterol from butter, beef tallow, lard and egg yolk.

Amesex are designing a pilot plant for extraction of pure eicosanpentaenoic acid (EPA) from menhaden oil; EPA is an OTC cholesterol-lowering agent. Extraction of pigment from algae is yet another area of interest.

SCF is now commercially exploited for chromatography. Treatment of waste water under SCF conditions is receiving attention. Protein Technology have an innovative idea to use SCF for peptide synthesis so that the use of expensive solvents like methylene chloride, dimethyl formamide, etc. can be avoided. SCF separation of cellulose, hemicellulose and lignin from wood continues to be probed. (*Chem. Week*, 1987, 140, No. 24, (24 June) 66-67).

Chemical technology of natural gas (NG) -- Its present status and prospects

Preub and M. Baerns (*Chem. Eng. Technol.*, 1987, 10, 297-305) have discussed several aspects

of NG whose short-term and long-term availability is rated as very good. A table gives typical composition of NG from different parts of world; Canadian NG may contain 36% H_2S ; Kirkouk NG containing 20% C_2H_6 and Texas gas contains 1.8% He. USSR holds about 43% of proven world reserves and is at a level of 43,000 billion cu.m. The NG pressure is brought down to 70 to 100 atm. before processing. The removal of CO_2 and H_2S is generally by chemical absorption processes though lately physical absorption processes (e.g. Selexol) are gaining importance. At low levels of H_2S (say below 100 ppm) adsorption processes can be used and below 5 ppm ZnO can be used which works at ambient conditions. Drying of gas is done by absorption in ethylene glycols. Separation of C_2 + hydrocarbons is via partial condensation or distillation, absorption or adsorption.

NG is a feed-stock for making $CO+H_2$ for NH_3 , CH_3OH , HCN; chloromethanes; CS_2 ; C_2H_2 are other products. (C_2H_2 from CH_4 has now lost momentum). NG can be converted to C_2 + carbon atom based products via methanol or FT synthesis based on syn-gas. In the recent past the direct conversion of NG is receiving attention. Gas phase synthesis at 1000°C with Cl_2 activation to give C_2H_4 has been considered.

The oxidative coupling of NG to C_2 + products is receiving a lot of attention; typical catalysts are based on alkali and alkaline earth compounds (Pb, La, Sm, Rb, etc. oxides have been considered). So far, even at high selectivities, maximum yields of only 15-20% can be realised. The catalysts get deactivated very fast.

It is estimated that a 350,000 mtpa plant would cost \$160 million. Only at very low prices comparable to that in Middle East can we justify NG based liquid hydrocarbons.

Regime analysis and scale-down : tools to investigate the performance of bioreactors

Sweere et. al. have discussed, in a comprehensive paper, scale-up and optimization of biotechnological processes on a large scale. Illustrative examples are given: Gluconic acid production; Microbial desulfurization of coal; Butanol from whey permeate in gas-lift loop reactor; Bakers' yeast production. The philosophy centres around regime analysis based on characteristic times. Many experimental

set-ups can be used to simulate large-scale fermentation processes on a small-scale. Mixing effects can increase as well as decrease the yield of biomass and the required metabolite. The importance of byproducts in discerning the controlling regime has not been properly recognised. For new products pilot plant experiments become necessary. (*Enzyme Microb. Technol.*, 1987, 9, 386-398).

Alpha Olefins (AO)

Chem. Week (U.S.A., 1987, 141, No. 16, Oct. 14) has given a very useful cover story on this subject. Ethyl, Shell, Chevron (originally Gulf) are prominent in U.S.A. and in North America markets are growing at 10% and are expected to be close to 1 million tonne per annum by 1991/1992. The use of butene-1, hexene-1 and octene-1 is growing very fast in the co-monomer market of LLDPE. Even polyalphaolefins (PAO) is expected to grow fast in 1990 and North American production may be 90,000 tpa. (In 1987 there has been a step-change for PAO).

Shell has a large plant for synthetic fatty alcohols (C_{11} - C_{13} Neodols) which on condensation with ethylene oxide give very useful non-ionic surfactants. In Europe Shell is the sole producer. Now new plants are coming up in USSR and Czechoslovakia. In Japan Mitsubishi Chem. Ind. has been producing AO but a new entrant, with its own technology, is now Idemitsu Petrochem. Co. who are putting up a 50,000 tpa plant.

New catalysts are being developed which give higher yields of the premium cuts from C_4 to C_{10} AO.

A new type of Chromatograph

Sanki Eng. Co. (Kyoto, Japan) has introduced a new type of liquid-liquid chromatograph (LLC) and this is also called centrifugal partition chromatography (CPC). LLC is claimed to be superior to GLC and HPLC as the CPC does not irreversibly retain mixture components. Mild conditions in CPC prevent breakdowns of chemicals; any pH can be tolerated as the danger of spoiling silica gel/alumina does not exist. A number of commercial units have been sold. Typical examples: Separation of human bile and chromomycin; Separation of Drugs.

CPC can be readily scaled for continuous operation. Solvents can be recovered and recycled and separation occurs in a closed system. (*Chem. Week*, 1987, 141, No. 18, (Oct. 28), p. 37).

Phenol to ortho cresol and 2,6 xyleneol: fluidised bed process

Katsumata and Dozono have given details of Asahi Chem. Ind. process for converting phenol to ortho cresol + 2,6 xyleneol via reaction with anol in vapour phase in a fluidised bed reactor. Catalyst is based on Fe-V oxide on silica. Experiments were done in 10 mm, 50 mm and 100 mm dia. reactors to get design data for a large plant. Asahi is operating a commercial plant since 1984. (*A.I.Ch.E. Symposium Series*, 1987, 82, p. 86).

Waste Gypsum decomposition to SO_2 and H_2S

Morris et. al. have reported a unique two-zone fluidised bed reactor operating in the temperature range of 1050 to 1150°C for decomposition of waste gypsum to SO_2 and H_2S and CaO. Decomposition to the extent of 95% was realised and SO_2 was greater than 5%. (*Chem. Abstr.*, 1987, 107, 15494).

Continuous sulfonation and fusion for phthalic anhydride

A continuous reactor for sulfonation followed by fusion reactor has been suggested. For ethyl benzene sulfonation, a 2.5:1.0 mole ratio NaOH (35.8% aq. solution) to ethyl benzene sulfonate (40% aq. solution) was contacted in a CSTR at 365°C, with a residence time of 2.9 hr. At 95.2% conversion, 87% ethyl benzene sulfonate was realised. (*Chem. Abstr.*, 1987, 107, 15494).

Zeolites in polyurethane foams (PUF)

A rigid PUF has been prepared containing 50% X zeolite. It is expected that the zeolite within the foam will retain adsorptive properties for flame retardants, etc. The zeolite is loaded with flame retardant catalysts after the foam is formed. These foams are claimed to have improved heat distortion properties, reinforcement capabilities, thermal resistance. (U.S.P. 451,18718, *Applied Catalysis*, 1987, 4, Oct., p. 371).

Turn on the gas

cent hike in the price of petrol brought into sharp focus the efficient management of oil resources in order to reduce dependence on liquid hydrocarbons. In this context, increased use of natural gas in the place of liquid fuel assumes importance. Mr. Nayyar, chairman of the Gas Authority of India, has pointed out that natural gas, a relatively newcomer in the energy market, has enlarged its base and has already become one of the mainstays of our energy supply along with oil and coal. It has found its way into all industrial energy consumption sectors, though this is so only in areas in the vicinity of gas fields.

A recent trend in oil exploration is that many new discoveries of natural gas bearing. Some of the recent gas discoveries are in the offshore and on shore fields, in the north and in the Krishna-Godavari basin in the South. The prognosticated reserves of the Krishna-Godavari and the Cauvery basins are as high as 500 billion cubic metres. Recent success in new gas finds strengthens the hope that the availability of natural gas for commercial utilisation will increase by leaps and bounds.

Mr. Nayyar has emphasised that the gap between demand and supply of oil products can be bridged by inter-fuel substitution and increased use of natural gas in the place of petroleum products. The alternative is import which the government wants to restrict. As a premium energy source, natural gas has distinct advantages in terms of investment, operating cost and higher fuel efficiency. It is preferred fuel in the fertiliser, power and transport sectors. It is in the place of LPG as a cooking gas is also considered a technological possibility. The stress should, however, be on widespread adoption of natural gas for conventional uses as well as to development of new uses. It calls for a co-ordinated effort by the Gas Authority of India and the industry. The engineering industry, in particular, has a crucial role to

play in developing and manufacturing efficient gas firing and control equipment. If the government and industry give high priority to increased use of natural gas, the pressure on the petroleum front is bound to ease.

POWER SECTOR CAN USE GAS IF SUPPLIES ARE STEADY

The minister of state for power, Mrs. Sushila Rohatgi said that the power sector would be able to utilise all the gas made available to it at reasonable price. It would help set up gas-based power plants if the quantity of gas to be made available to them was firmed up.

Addressing a conference on "Utilisation of hydrocarbon resources of north-east India", organised by 'Urja' a journal on energy, in New Delhi, she said that despite the annual growth rate of 8 to 10 per cent in recent years in the power sector, the demand for electric power was outstripping supply. It was therefore necessary to develop the energy sector in an integrated manner with the harnessing of both conventional and renewable sources of energy.

Mrs. Rohatgi pointed out that in order to meet the projected demand for electric power at the turn of the century, financial resources amounting to Rs. two lakh crores would be required. The country had large hydro potential mostly in the north and north-eastern region. This potential could be harnessed if adequate financial resources were forthcoming, she added.

She pointed out that energy conservation was no less important than power generation. A mass awareness on the need of energy conservation should therefore be created she said.

In his keynote address, Mr. Bishma Narain Singh, Governor of Assam and Meghalaya, pointed out that though the north-east has been known to contain enormous resources, the utilisation through the medium of modern technologies has been rather slow. The region continues to be backward

with a heavy backlog in terms of investments.

He said according to a thumb rule estimate, the amount required for utilising the entire power potential in the north-east would be in excess of Rs. 50,000 crores.

The petroleum minister, Mr. Brahm Dutt, stated that a major factor inhibiting the economic development of the north-east region through either industrialisation or advancement in agriculture was its remoteness from the markets within the country or a port which can serve as outlet for export of products. This was compounded by the relatively small size of the market available in the region itself.

MORE THAN 80 MILLION U.S. DOLLARS INVESTED: DEGUSSA'S HYDROGEN PEROXIDE PLANT IN ALABAMA, U.S.A., GOES ON STREAM

The hydrogen peroxide production plant built in the past two years on Degussa Corporation's site in Mobile, Alabama (USA), has now been successfully commissioned. It has an annual capacity of 36,000 tons and operates according to a Degussa process. Including the necessary infrastructure, it cost more than 80 million US dollars. Hydrogen peroxide produced by the plant is to be exported as well as sold in the US markets. The largest customer group is the cellulose treating industry (textiles and paper), which uses the product as an environmentally acceptable bleaching chemical. Hydrogen peroxide is also used as a synthesis intermediate in the chemical industry, as a raw material for the manufacture of detergent components and to an increasing extent for environmental protection purposes, for example, the elimination of toxic substances or those with objectionable odours from effluents. The processes developed by Degussa for the use of hydrogen peroxide in these areas of application have proved highly successful in the USA.

Degussa also produces hydrogen peroxide in the Federal Republic of Germany and in Belgium; the new plant increases the company's total production capacity to more than 160,000 tons per year.

SYNTHETIC DETERGENT UNITS:

Plea for ST, octroi reliefs

Mr. V. K. Jain president, Small-scale Detergents and Soaps Manufacturers Association, has urged the state government to allow small-scale synthetic detergent units a five-year exemption from sales tax and octroi duty so that units in West Bengal are not placed in a disadvantageous position vis-a-vis other states.

In this context, he mentioned that Gujarat has now extended further concessions to industry and now detergent units in Gujarat only pay one per cent central sales tax. Mr. Jain was addressing a workshop on synthetic detergent industry in Eastern India.

Besides, he said, this would not mean any loss of revenue to the state as the present tonnage of SSIS in the region is negligible as compared to the possible tonnage that can be achieved if the levies were withdrawn. In that case, he added the revenue earned from purchase tax will more than compensate for ST and octroi.

Against a demand of one lakh tonnes of detergents per annum in the

Eastern region, he said, the units in the Eastern region, mostly concentrated in West Bengal, are producing only 10,000 tonnes. This is not because of any complacency on the part of the entrepreneurs, Mr. Jain said and added that it was rather because of lack of financial resources and the shortage of raw materials as well as high price prevalent in other parts of the country.

Talking about the raw materials situation in particular, Mr. Jain said it was gratifying that IPCL has withdrawn the freight levy of Rs. 1616 per tonne with effect from January 1 this year which will allow detergent units in this region to get IPCL LAB (Linear Alkyl Benzene) supply at the same price applicable nationwide. "We would also request the other basic raw material manufactures to follow the IPCL example", he added.

Mr. P. K. Banerjee, secretary, Cottage and Small-Scale Industries, government of West Bengal, in his address, called upon the detergent manu-

facturers to set up units in the districts. The state government will offer all possible assistance in the regard, he said. He also assured workshop that the state will consider the question of ST and relief.

Quoting statistics, Mr. Somnath Chatterjee, MP and chairman of the SIC, said the demand for synthetic detergents will touch 11.13 lakh by the turn of the century accounting for 50 per cent of the total raw materials market. Against this drop, Mr. Chatterjee said, the industry has tremendous potential for growth.

PERSONALITIES

Dr. O. P. MEHRA

Dr. O. P. Mehra has been president of the Manufacturers Association for Information Technology.

T. RANGANATHAN

Mr. T. Ranganathan has been in charge as the Managing Director, Facit Asia Ltd., Madras.

K. K. BHATIA

Mr. K. K. Bhatia has been chairman of the Chemicals & Products Export Promotion Council.

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Depleting ozone layer catastrophic

If progress to protect the environment has been slow, still less has been done to counter the potentially more serious problems of the depleting ozone layer in the atmosphere.

A weakened ozone shield could prove catastrophic to early life, scientists have warned.

"A continuing deterioration of earth's ozone shield would expose human beings to increased ultraviolet radiation, causing serious skin cancers. It would kill plankton and reduce yields of many crops specially cabbage, squash and soyabean, says Dr. Narasimhan Sundarraman, a specialist on the subject at the World Meteorological Organisation (WMO) in Geneva.

Today with growing evidence that man-made emission is eating ozone away, scientists have been joined by environmentalists in Europe and USA calling for an urgent action to stop the catastrophe.

According to scientists, the main culprits for thinning ozone are chlorofluoro carbons (CFC) which are central elements in air conditioning, insulations, solvents, fire extinguishers, polyurethane foams and many other products.

Neither poisonous nor inflammable, they are easy to use, besides being inexpensive.

When released in the air, they can remain stable for as long as 100 years or more, over the time they rise into upper atmosphere, i.e., stratosphere which contains ozone layer.

When CFC rises to the ozone layer, sunlight decomposes them, releasing the chlorine they contain. Chlorine acts as a catalyst breaking ozone apart without being affected itself. The ozone depletion in turn allows more radiation to reach the ground.

"Besides, causing other ecological imbalances, this radiation alters several responses of the immunological system, causes certain type of skin cancer and also destroys crops and plants," says a United Nations Environment Programme (UNEP) report.

Environmental Protection Agency (USA) predicts that a one per cent drop in global ozone could cause 20,000 additional cases of skin cancer in the US annually.

According to an estimate west produces about 7,50,000 tonnes of CFS

each year, with the Soviet Union producing another 60,000 tonnes and world production of other probable ozone depleters amounts to another 2,00,000 tonnes with an annual value in the range of \$2 billion.

While all the world industrial nations including the Soviet Union recognise that CFC presents a potential danger to environment, they differ radically on the urgency of the problem. The US together with Canada and the Scandinavian countries would like to freeze CFC emissions at the earliest.

Environmentalists in the US are now calling for 30 per cent reductions in the emissions of certain compounds by 1988, 85 per cent reduction of the same within five years and complete phase out within 10 years.

The Chemical Manufacturers Association of USA which throughout the seventies argued that CFC were innocent of all ozone depletion charges, is now spending two million dollars a year on research and development of CFC substitutes.

But countries like the UK, France and Spain remain unenthusiastic. Similarly larger developing countries, India, China, Brazil are concerned that a rigid clampdown on CFC might work to their disadvantage.

The 'hole in ozone', the reduced concentration of ozone layer over Antarctica appears each year in October and lasts for a month. The phenomenon, in fact was detected by British researchers early in the seventies but became pronounced only in recent years.

"The new findings by scientists in Antarctica suggest that CFC emissions are causing ozone depletion of 50 times greater than should be expected", says Mr. Susan Solomon, a scientist with the National Oceanic and Atmospheric Administration (NOAA).

No explanation for the phenomenon that mysteriously punctures the earth's protective umbrella at Antarctica has been widely accepted. CFCs are not the only potential killer of the ozone layer. There is a possibility that the exhausts, particularly oxides of nitrogen from the super sonic transport (SST) might also be damaging the ozone layer.

"But there are few super sonic transport in operation that will cause no sport in operation that will cause no

detectable domination of ozone," a report by the National Academy of Sciences.

A recent study by Dr. L. W. and Dr. Murli Natarajan of Aeronautics and Space Administration (NASA) suggests, "the one year cycle that peaked late in 1979-1980 was the second strongest in the past 250 years to trigger the formation of nitrogen dioxide which was transported to Antarctic region by normal atmospheric circulation, resulting in destruction of ozone layer."

PLEA TO CHECK ENVIRONMENTAL DESTRUCTION

Noted agriculture scientist M. S. Swaminathan has warned that the present pace of environmental destruction all over the world would lead to a grim situation by the year 2000.

Delivering the inaugural lecture of the H. S. Kamath lecture series at Bhopal, recently, Dr. Swaminathan said the need of the hour was to have a dynamic and sustainable development in the country which should not be at the expense of the future generations.

He pointed out that conservation and sustainable development were two sides of the same coin. Rampant cutting of trees for agricultural expansion should be stopped and attempts should be made to compensate for wastage by undertaking massive afforestation of wastelands which were not suitable for agricultural purposes. This would check eroding of the environment, he said.

Dr. Swaminathan said that the Stockholm conference on environment and pollution in 1972 which was presided over by Mrs. Indira Gandhi, all issues of ecological balance were taken for consideration. Mrs. Gandhi had said "poverty is the biggest factor in environmental degradation", a fact reiterated a decade later in 1982, at a UN conference. He said the situation had gone from bad to worse.

Dr. Swaminathan suggested that measures be taken to check the deterioration of environment and that a plan be chalked out for conservation and sustainable development.

He pointed out that land resources in many parts of the world were at the lowest level.

A Sweet Surprise

and Natural Gas Commission discovered the biggest under-sweet water lake in the Ganga while exploring for oil.

Calling this as a "very exciting development," the Petroleum Minister, Mahm Dutt recently said the water reservoir in the Ganga extended from western Uttar Pradesh to West Bengal. The depth of the underground lake varies from 100 to 7000 feet. The water out of the reservoir on its own

and the Water Resources Minister preparing plans for utilisation of ground water possibly in the Eighth Plan with the help of international agencies including the World

Minister was talking to newsmen releasing a special issue of "Petroleum Asia Journal," on the occasion of the inauguration of Refineries Ltd. (MRL).

The Minister said the HBJ gas pipeline was being extended to Delhi to supply gas to the power station being

set up by the Delhi Electric Supply Undertaking (DESU). The extension of the pipeline to Delhi, costing about Rs. 125 crores, is expected to be completed by May 1989.

He said the demand for petroleum products was growing at the rate of eight per cent per year and the total demand by the end of the century was expected to be around 100 million tonnes per year. The total consumption of petroleum products in the current financial year is estimated at 47 million tonnes.

The country has to set up more refineries in the Eighth Plan to meet this growing demand, as the present refining capacity was only 48 million tonnes, he added.

The Minister was optimistic about the country achieving the Seventh Plan target for crude production at around 35 million tonnes per year. The indigenous production of crude oil now is only a little over 30 million tonnes.

He said the current strategy was to put on early production system even on small discoveries of oil or gas in the country.

The Minister said the Government will soon take a decision on the diversification plan of the MRL for producing aromatics at a cost of Rs. 840 crores.

MRL Chairman and Managing Director, Mr. V. R. Deenadayalu, said the company had already shortlisted three parties including one in the public sector as co-promoter of the project. The projects include facilities for the production of 25,000 tonnes of food grade hexane per year.

RUBBER FOR SMALL UNITS

The State Trading Corporation will release natural rubber to small units holding a Rubber Board licence upto 50 metric tonnes annually with effect from January 19, 1987. The rubber will be released from Delhi, Bombay, Calcutta, Madras and Jalandhar under the cash and carry scheme. Release to units holding licences for more than 50 metric tonnes will be announced later, according to a STC press release.

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Industries told to step up R & D

M. G. K. Menon, scientific adviser to the Prime Minister, appealed to the industries to do more than their share and a measly ten per cent on research and development. If the country was to advance industrially and economically.

He said a large chunk of the expenditure on R and D was borne by the government, accounting for nearly 50 per cent, while the states spent 10 per cent and industries a mere ten per cent.

He maintained that complaints from the industries quarters that the government was not doing enough for R and D that there was a dearth of investment in science and technology was not commensurate with the progress achieved.

Menon was delivering an address before presenting the Vividhlabhaskar Samshodhan Vikas Kendra (VSVIK) awards to 30-odd scientists in various scientific disciplines. The Minister for human resources, Dr. V. Narasimha Rao, who was the chief guest, could not attend. The VASVIK awards were instituted in 1976 and first distributed in 1976 to the cream of scientific talent who aided the country's industrial and economic growth. So far over 100 scientists had won VASVIK awards.

In the function, the awards for 1985 and 1986 were combined and awarded to 26 winners. Some of the winners, who had not taken their awards in previous years, received.

Menon said the original intention behind the awards was to recognize the scientific work accomplished in the country by individuals or groups to enhance productivity, efficiency and well-being.

The concept was borrowed from the Royal Society awards instituted by the Royal Society, which had speeded up the economic prosperity for Britain.

He said two points in any scientific revolution was the inevitable technological changes and the transformation of various aspects of life, economies and societies. Scientific change was taking place at a very great speed and at an exponential growth rate, he said.

The industries' challenge was to enhance the use of science optimally to develop the country so that more wealth

was created and the country's industrial and economic progress was advanced.

The winners of the 1985 awards are: Dr. Inder Pal Abrol (agricultural sciences); Dr. Prabhakar S. Borker, Dr. S. Ramachandran and Dr. Churya Sivaraman (biological sciences); Dr. Gopalakrishna Thyagarajan (chemical sciences); Prof. P. V. S. Rao, Gr-Capt A. B. Mehta, Wg-Cdr. J. R. Bankapur, Mr. Sugata Sanyal, Mr Aniruddha Sen and Wg-Cdr T. V. Venkataraman (electrical and electronic sciences); Mr. Pradip Ranjan Roy (material sciences) and Mr. Areckal Paul Jayarajan and Mr. Suresh C. Tapde and (Chandaben Mohanbhai Patel industrial research award for women); Dr. (Mrs.) Swarn Nityanand (mechanical sciences).

The winners of the 1986 awards are Dr. S. C. Mohapatra and Dr. Dalbir Singh Dev (agricultural sciences); Dr. B. N. Dhawan (biological sciences); Prof. Rajinder Kumar and Dr. G. R. Venkitakrishnan (chemical sciences); Dr. K. P. P. Nambiar (electronic sciences); Dr. M. Ramamoorthy (electrical sciences) and Dr. S. Rajagopalan, Dr. A. Krishnan and Mr. A. V. Ramani and (Chandaben Mohanbhai Patel industrial research award for women scientists) Prof. (Mrs.) Sulochana Gadgil (mechanical sciences).

Mr. Mohanbhai I. Patel, chairman of the VASVIK board of directors and former Sheriff, said Indian industrial research was not very satisfactory.

"Countries such as Malaysia, Thailand, Indonesia, Phillipines, South Korea and China, who could not boast of scientific attainments as good as ours, have already established a substantially high figure for gross national production and maintain a higher growth rate", Mr. Patel remarked.

He said the per capita income in India was \$250, Pakistan \$390, China \$540, Indonesia \$900, Malaysia \$1,400, South Korea \$2,200 and Singapore \$4,400.

Mr. J. Veera Raghavan, secretary in the Union ministry of human resources, said the challenge before everyone was to convert the talents of the vast teeming millions into real assets.

Mr. Viren Shah, former M.P. and former president of the Indian Merch-

ants' Chamber, said a revolution in research that was low-cost and risk-free and productivity-oriented was required.

Dr. M. G. K. Menon read out the citations and Mr. A. V. Mody proposed the vote of thanks.

SEMINAR ON "MODERN TRENDS IN ANALYTICAL TECHNIQUES"

The Indian Society of Analytical Scientist, a society formed to meet and educate quality awareness in the industrial and research field. It keeps the scientist community informed with the latest in the State of Art techniques of Analytical Chemistry.

ISAS is now holding a seminar on "Modern Trends in Analytical Techniques in Life Sciences", sponsored by M/s. Spectrochem Pvt. Ltd., at Institution of Engineers, 15, Haji Ali Park, K. Khadge Marg, Bombay-400 034, on Friday, the 29th of January, 1988. The seminar will be inaugurated by Dr. V. K. Iya, former Director, Isotope Group, BARC.

The seminar is aimed at focussing the analytical techniques, which have grown up in the field of Medicine, Genetic Engineering, Agriculture etc. Renowned scientists from these disciplines working at BARC, TIFR, will present their work and papers to benefit scientist and students in the related field.

Further details can be had from Dr. C. S. P. Iyar, Convener of the Symposium, or from M/s. Spectrochem Pvt. Ltd., 1129, Navjivan Chs, Bldg. No. 3, Dr. Bhadkamkar Marg, Bombay-400-008. Telephone No. 371317, Sponsors to the Symposium.

PHYSICIST DEAD

Mr. I. I. Rabi, a Physicist who won the Nobel prize in 1944 and helped develop radar and the atomic bomb, died on Jan. 11 after a long illness. He was 89.

Mr. Rabi, who died at his home, was the former Chairman of the Physics Department at Columbia University. His death was confirmed by Mr. Fred Knobel, a University spokesman.

He was known primarily for his work on magnetism, molecular beams and quantum mechanics. He won his Nobel prize for his discovery and measurement of radio-frequency spectra of atomic nuclei whose magnetic spin has been disturbed.

New mineral finds by MEC

The Mineral Exploration Corporation Ltd. established 1,494 million tonnes of reserves during the quarter ending September 1987.

These reserves comprised 492.275 million tonnes of prime coking coal, 1001.377 million tonnes of non-coking coal and 0.381 million tonnes of gold ore.

Nine final geological reports were submitted during the quarter, and as against a target of 76,000 metres of drilling, 58,420 metres of drilling was carried out with an input of 473 drill months, giving an overall productivity of 124 metres per drill month.

In Lohara West of Wardha Valley Coalfields, an area of 7.88 square km has been explored in detail for coal. A total of 8994.55 metres of drilling was done in 56 boreholes. One composite seam has been intersected. A total of 120.497 million tonnes of non-coking coal reserves have been established of which 48.237 million tonnes are of open cast and 72.260 million tonnes are underground reserves.

An area of 5.6 square km has been covered by drilling 57 bore-holes in

Mandla South of Western Coalfields Ltd. (WCL). Five seams with nine sections have been intersected. A total of 80.4 million tonnes of non-coking coal reserves have been established.

In New Laikdih of Bharat Coking Coal Ltd. (BCCL) an area of 0.2 sq. km has been covered by drilling nine boreholes involving 1,083.35 metres of drilling. Additional data of 689.81 metres in seven boreholes drilled earlier have also been considered for interpretation. Four coal seams have been intersected. A total of 2.34 million tonnes of medium coking coal reserves have been established.

Chigargunta Block-III (West) was explored for gold by developing I and II levels by underground drilling and mining. An area of 0.42 sq. km has been covered by surface geological mapping while 1,462 metres was covered by underground mapping. A total of 7,328.70 metres of surface drilling in 22 boreholes and 171.65 metres of drilling in 25 boreholes has been considered. A total of 0.381 million tonnes of reserves with 5.17 grams

per tonne of gold have been established.

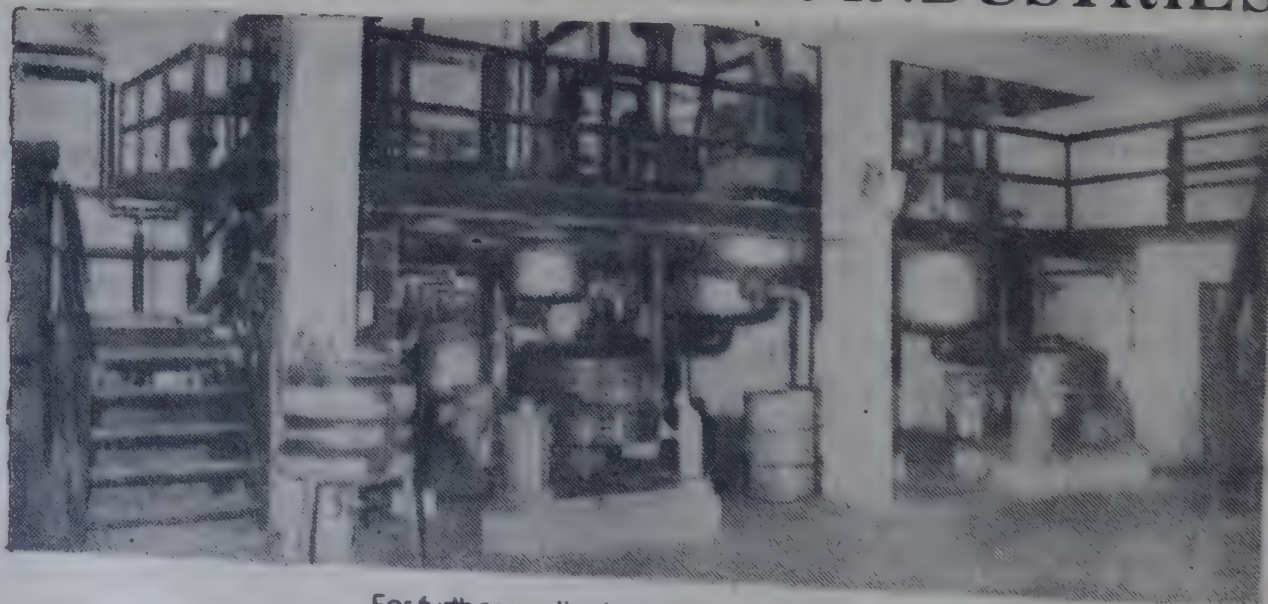
In Victoria Block of BCCL, an area of 2.3 sq. km has been explored for coal. A total of 6376.20 metres of drilling has been achieved in 16 holes. Twenty-three coal seams of 0.50 metres and above thickness have been intersected. A total of 1 million tonnes of coal reserves have been established of which 30.5 million tonnes are coking coal and balance 85.967 million tonnes are non-coking coal.

An area of 8.99 sq. km has been explored for coal in Bhowra (I). This block comprises South and North Sudamidih Bhowra and north-east Bhowra. A total of 616.288 million tonnes of coal reserves have been established of which 150.00 million tonnes have already accounted in Sudamidih Bhowra block during 1978-79.

In Bhatgaon of Biarampur Coalfield, an area of 10 sq. km, has been explored for open cast potential. 78 boreholes have been drilled, achieving 2699.90 million tonnes of drilling. Two coal seams have been established of which 31.594 million tonnes are open cast and 4.260 million tonnes are of underground reserves.



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NODES:

Indigenous tech being ignored

Madras-based multinational manufacturer of chemicals has been given licence to produce metal anodes for caustic soda plants, requiring substantial technology imports from its parent company in England, despite the fact that the same technology has been developed indigenously and made commercially available by the Madras-based Chemfab, Mr. C.H. Krishnamurthy, chairman of the group said, in a report on January 16, reports the Times.

During a press conference, Mr. Rao said that in spite of making representations to the government in this regard, there had been no change. "On the one hand they talk of encouraging indigenisation and conservation of foreign exchange, and on the other they grant licences to multinationals involving forex outgo of Rs. 4000 per anode, at the cost of indigenously developed products".

Mr. Rao noted that the process of manufacturing metal anodes had been developed from the National Research Development Council (NRDC), on a licence of royalty amounting to Rs. 1000 per tonne. The Chemfab group had taken it further and made a commercial success of the technology. The metal anodes for electrolytic soda-chlorine plants based on membrane cells were being used by at

least 60 per cent of the caustic soda plants in the country, he said.

Mr. Rao said that it was ironical that his company, Titanium Equipment and Anode Manufacturing Company Limited, had even exported this technology to a company in Australia in return for a recurring royalty payment, while India was planning to import the same technology.

Mr. Rao said that his group had gone a step further and developed the membrane cell technology for caustic soda plants through which the use of mercury was totally eliminated. This technology, under Chemfab Alkalies Limited, had the twin advantage of energy conservation of almost 30 per cent as compared to the conventional mercury-based plant, as well as elimination of mercury pollution.

Mr. Rao noted that at present a staggering quantity of 250 tonnes of mercury was dumped through the sludge leading to pollution of the environment. He urged the government to promulgate a law, as had been done in Japan, making it mandatory for mercury cell based plants to be converted to membrane cell plants within a specified period.

According to the unaudited financial results of the six months ending December 31, 1987, Chemfab Alkalies Limited recorded a net profit of Rs. 39.60 lakhs as compared to Rs. 14.29 lakhs for the corresponding pe-

riod of the previous year. The Chemfab group turnover recently stands at Rs. 25 crores, according to Mr. Rao.

ALUMINIUM PRICES INCREASED 5.8%

The Government has revised upwards the ex-factory average selling price of aluminium by Rs. 1,381 per tonne with effect from Jan. 19th. This price increase of 5.8 per cent takes the ex-factory sale price from Rs. 23,928 per tonne to Rs. 25,309 per tonne.

The basic customs duty on aluminium, on the other hand, has been decreased from Rs. 2,000 per tonne to Rs. 1,000 per tonne with effect from January 15. The Government had earlier reduced the customs duty from Rs. 3,700 per tonne to Rs. 2,000 per tonne in end-October 1986.

The twin moves of increasing the sale price and reducing the customs duty, has been done with a view to covering up the losses incurred on aluminium imports in the recent past since the international price of the metal has shot up substantially. Even now, the international price of aluminium is about Rs. 25,000 per tonne in the spot market.

Apparently, the Government decided on the price and duty adjustment in view of the fact that aluminium imports in the current financial year are expected to be around 70,000 tonnes, the highest in recent times. Last year, imports were 55,000 tonnes and in the year before last, even lower at 31,000 tonnes.

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ICMA-ETAD SEMINAR ON

'Ecological and Safety Aspects in Dyestuffs Industry'

The Indian Chemical Manufacturers Association in collaboration with the Ecological and Toxicological Association of the Dyestuffs Manufacturing Industry (ETAD) had organised a one day seminar on 'Ecological and Safety Aspects in the Dyestuffs Industry', in Bombay on January 12.

The ETAD secretariat had nominated two technical experts, Dr. R. Anliker and Dr. (Mrs.) D. Steinle to conduct the seminar. The topics covered in the seminar included broadly: Prevention of risks in the use and handling of colorants; Health and environmental aspects of dyes; Risk assessment considerations; Retrieval of toxicological and ecotoxicological information in colorants; and Results of important projects of ETAD.

About ETAD

ETAD, an international organisation comprising principally the major dyestuff manufacturers in the world aims at pointing out more realistic and cost-effective approaches to achieving regulatory objectives.

The rapid growth in environmental legislative activity in the sixties at both national and international levels called for a collaborative approach by the industry with close coope-

ration with the regulatory authorities. This led to the establishment of ETAD in 1974. Its current worldwide membership of 28 companies (including 2 major Indian manufacturers) represents over 80% of worldwide colorant production.

Under its by-laws ETAD deals exclusively with ecological and toxicological problems and has the following specific objectives:

1. To coordinate and unify the efforts of manufacturers of dyestuffs and organic pigments to minimise possible damage to the environment arising from the use and application of these products and to provide the best possible and practicable protection for the users and consumers of these products.
2. To aid and cooperate with government agencies and any other public institution, concerned with the ecotoxicological impact of these products.
3. To represent as spokesman the position and interests of this industry sector towards authorities and public institutions.

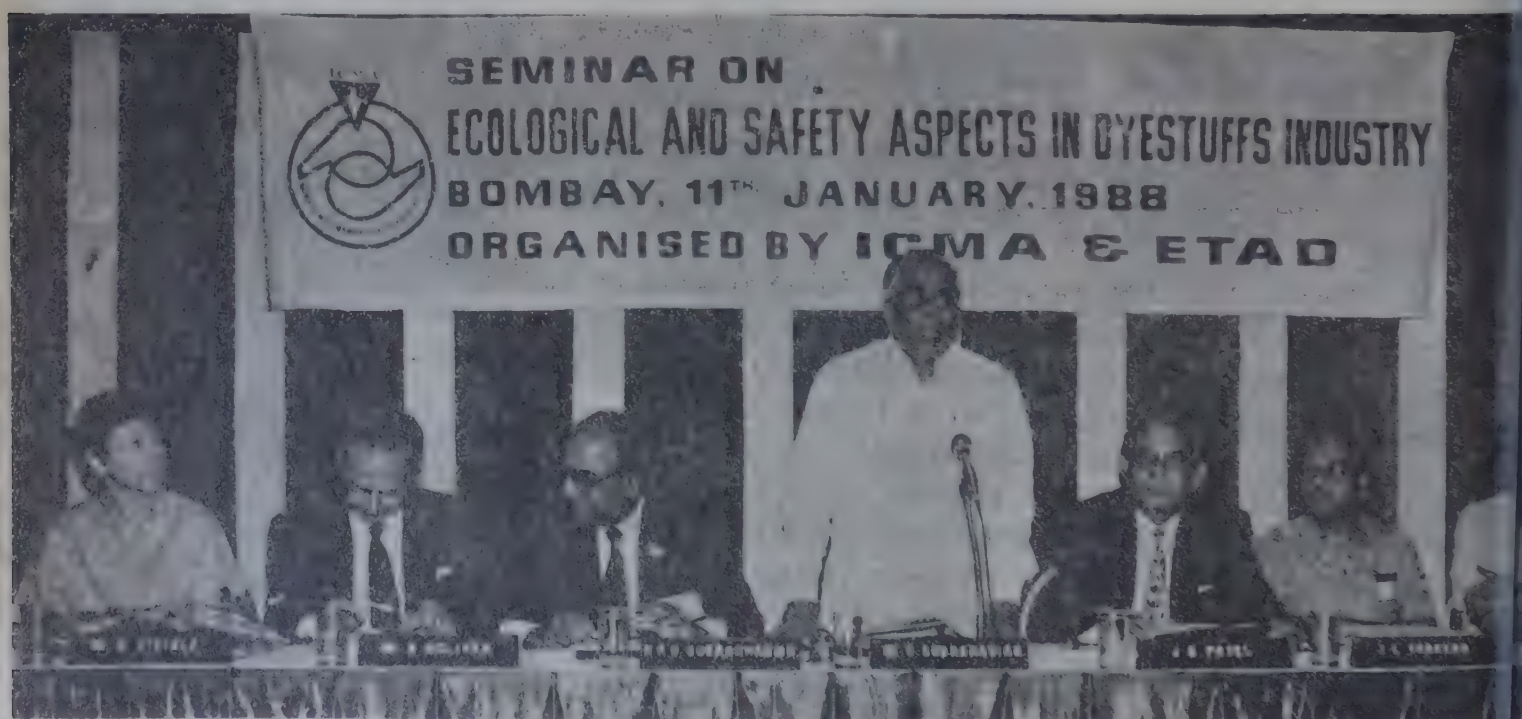
With Analytical, Ecological, Labelling Regulations, Toxicological and Pigments Committees, ETAD undertakes a wide variety of

projects which are coordinated by technical Committee reporting to the ETAD.

Seminar Proceedings

In his welcome address Shri K. Subrahmanian, President, ICMA, called for a national balance between the need for economic development and ecological protection. While highlighting the role of the chemical industry in improving the quality of our life, Shri Subrahmanian asserted that it was this very industry that possessed the wherewithal to control pollution. A commitment to the care of the environment was called for, and the Indian chemical industry was rising to the task.

In his review of Environmental legislation, Shri J.L. Thakkar, Chairman, Pollution Problems Sub-Committee, ICMA, commented that the Environment Protection Act of 1986 was a step in the right direction. Though in his opinion "would have to ensure the presence of competent economic activity to create wealth." The Act recently brought into force lays down standards for the quality of the environment and stipulates maximum permissible emissions which are permissible. The Act, with rigid and judicious enforcement, will catalyse the upgradation of technology to meet the standards.



Dr. V. Subramanian, Minister for Energy, Environment & Housing, Govt. of Maharashtra, delivering the Inaugural Address. Seated from L to R: Dr. (Mrs.) D. Steinle, Dr. R. Anliker (ETAD), Mr. K.R.V. Subrahmanian, President, ICMA, Mr. J.L. Thakkar, Chairman, Dyestuffs & Dye-Intermediates Sub-Committee, Mr. J.L. Thakkar, Chairman, Pollution Problems Sub-Committee, and Mr. Ashok M. Kadakla, Chairman, Western Region, ICMA.

inaugural address, Dr. V. Subraman-
for Energy & Environment, cau-
in a race of industrial growth it was
to ensure that no repetition of
occurs and that the environment

ed that the Antop Hill Warehousing
as now under the review of the Garg
ee, which is likely to recommend the
chemicals which can be stored in
considering the mushrooming of pop-
the area. The suggestions of the
ee, he added, were eagerly awaited.

al Sessions

first paper 'Health and Environmental
Dr. R. Anliker, Executive Secretary,
resented a realistic assessment of the
risk arising from colorants, drawing
available toxicological and ecotoxicolog-

ical data, along with knowledge of the phy-
sicochemical, coloristic and application
properties of the colorants. The paper con-
cluded that colorants could indeed be used
without any unreasonable risk provided that
adequate working conditions and safety pre-
cautions are observed.

The second paper presented by Dr. Anliker,
titled, 'Prevention of Risks in the use and
handling of colorants', stressed the need for
effective communication of hazard and safety
information on the product used and handled.
Minimisation of exposure by good working
practices and continuous monitoring of health
of people handling colorants was also strongly
urged.

In the second technical session, Dr. D.
Steinle, Senior Scientist, ETAD, outlined the
process of information management that
ETAD undertakes to coherently store and

retrieve the flood of information on toxicolog-
ical, ecological and safety of colorants. Dr.
Steinle, then proceeded to review some of the
major projects undertaken by ETAD. These
projects are under the objectives of ETAD viz.

1. Development of standardized testing methods.
2. Collection and classification of available data as a basis for identification of possible problem areas.
3. Investigate studies of —
 - a) probable behaviour of products in the environment;
 - b) exposure of man to organic colorants during production, processing and on the substrate;
 - c) toxicological risks of products.

The papers were followed by a panel dis-
cussion which evinced keen interest from the
participants.

Workshop on Synthetic Detergent Industry In Eastern India

of product should not be sacrificed by
stry although price is not less impor-
served Shri Santi Ranjan Ghatak,
Bengal Minister of Labour, in the Work-
Synthetic Detergent Industry in East-
ia held on January 8, 1988.

Workshop was jointly organised by the
Scale Detergents & Soaps Manufactur-
association, Calcutta; Small Industries
Institute, Government of India, Cal-
Directorate of Cottage & Small Scale
ies, Government of West Bengal and
adu Petro Products Ltd., Madras. It was
at Park Hotel Calcutta. Shri Ghatak
d the Small Scale Units that their
its for waiving government levies in the
of Sales Tax and Octroi etc. would be
up with the Finance Department and for
e request the Association to take
up action. He also agreed with the pro-
of marketing detergents through gov-
ent channels like Ration Shops etc. He
called up the Association to help imple-
ation of the Self-employment schemes
tion by the State Government (SESRU).
so assured of taking up the proposal for
concession in the tariff of advertisements
gh T.V. with the Central Government.

ri Somnath Chatterjee, M.P., Chairman,
Bengal Small Industries Corporation, in
inaugural address, assured the Associa-
all possible help from his corporation. In
he declared that certain raw materials for
industry manufactured by IPCL were being
n up for distribution.

In the key-note and presidential address,
Prof. Manindra Mohan Chakrabarty, Former
Vice-Chancellor, Jadavpur University, called
upon the small entrepreneurs in the industry
to undertake research and development so
that new detergents could be developed and
new uses also could be found out for the exist-
ing product.

In the introductory talk Shri V.K. Jain, Pres-
ident of the Association, narrated the present
position in West Bengal and suggested var-
ious measures like withdrawal of statutory
levies, making availability of raw materials at
all India prices. In his address he said that
there existed a yawning gap between the local
production and demand for the product. Since
it was a labour intensive and less capital
intensive industry, there was no reason for its
sluggish growth. State Government should
take some remedial measures.

Shri P.K. Banerjee, C&SSI, Government of
West Bengal, suggested that the small scale
units manufacturing detergents should market
their product under a common brand name
that would reduce individual cost on adver-
tisements. He called upon the industry to
market their product in the vast rural areas and
Sub-Divisional towns where the most of the
consumers were concentrated. He observed
there was enough scope for the development
of the industry as the market was expanding
every year.

Initiating the Technical Session, Shri A.M.
Chakrabarty, Director, C&SSI, Government of

West Bengal, requested the participants to
formulate an Action Plan for the development
of industry and also to take periodic stock
taking on the achievements and failures of the
Action Plan.

Shri A. Bandopadhyay, Director, Small
Industries Service Institute (SISI), Govern-
ment of India, Calcutta, welcoming the del-
egates, called upon them to come out with
concrete suggestions so that the present trend
could be reversed.

In the Inaugural Session, Shri P.R. Singhvi,
Regional Manager, IPCL, Calcutta, declared
that his organisation from 1st January, 1988,
introduced All India Price for LAB and other
raw materials. He felt that if the gap between
the demand and supply could be bridged to
atleast 3 to 3.5 lakhs employment could be
created in this region.

Shri Satish Kumar, Chief Marketing
Manager, Tamilnadu Petro Products Ltd.,
declared that they started marketing their
'Super-LAB' in West Bengal recently and dis-
cussed the advantages particularly in the
small scale sector of the use of their product.
He also informed that a technical wing had
been established to support technically small
scale units.

Shri S. Kar, Joint Director of Industries,
moved a hearty vote of thanks. The Workshop
was attended by eminent speakers from the
academic fields including Universities, Indus-
try and Government Officials.

Power from vacuum

An Indian scientist working with the Department of Atomic Energy, Bombay, has developed a machine which generates electrical power from pure vacuum.

Paramhansa Tewari says his machine called the Space Power Generator (SPG) which creates electrical energy from absolute vacuum, has an efficiency greater than unity.

The incremental power ratio for output is about 3.5, Tewari says, in his published paper 'Electrical Power Generation From Absolute Vacuum'.

The device is based on Tewari's space vortex theory according to which absolute vacuum can be rotated at a high speed. This rotation of vacuum gives rise to "voids" in space which physicists call electrons. Electric current is simply the flow of electrons.

In the SPG, the rotation of vacuum helps create electrons which are used as a source of electrical potential.

The essential components of the SPG which Tewari has constructed are a bronze shaft, a soft iron cylindrical rotor with good permeability and electrical conductivity, and an electromagnetic embedded in the rotor.

The coil, the rotor and the shaft are one integral assembly with good electrical conductivity between the shaft and the iron rotor.

Unlike conventional electrical generators, the SPG does not have electrical conductors in a separate stator. The iron rotor itself acts as the conductor and also establishes a magnetic field in it. There is no relative motion between the magnetic field and the rotor (conductor) when the machine is rotated at high speed through a drive motor. Electric power at high DC current (1500 A) and low voltage (2.9V) DC is extracted from SPG through brushes at inner rotor surface and shaft. The main features of SPG, that contrasts it from a conventional electrical generator are: very high current and low voltage DC power, direct generation of DC power without commutator, absence of stator, high speed of rotation, no relative motion between conductor and magnetic field, efficiency of energy generation higher than unity.

The DC power generated in SPG can be directly fed to a Faraday Mo-

tor which is suited to take high DC current and low DC voltage as its input. Only part of the generated power in SPG will be used to drive SPG — Faraday motor set, as efficiency of generation will be higher than unity. The remaining power will appear on the shaft as a mechanical torque that can drive a conventional generator.

PETROL FROM BAGASSE

Petrol will be manufactured from bagasse (juice extracted sugarcane) by a private sector company in Ludhiana.

Mr. Abey Oswal, Chairman and Managing Director of Oswal Agro Ltd., said that Petro Bross of Brazil would be supplying the technical know-how for this project. The petrol manufactured thus would be available at half the price of conventional petrol.

Explaining, Mr. Oswal said that the sugar unit of his group would be able to supply the requisite bagasse. The capacity of the mills would be increased from the present 1,200 tonnes per day to 4,000 tonnes.

The company has plans to produce kerosene also. This would help users of generator sets and tractors to start with this kerosene would be sold in the northern States.

The total investment required for these projects would be about Rs. 40 crores.

Mr. Oswal said the company would manufacture vinyl acetate monomer at a factory to be located at Noida, near Delhi. An agreement with Noble Industries of the US has been signed for obtaining the technical know-how. The raw material for making the monomer is available from one of the units of the company.

The monomer project would cost about Rs. 100 crores. A sum of Rs. 35 crores would be from internal accruals. The balance would be as loan from financial institutions.

The company hoped to have a turnover of Rs. 200 crores during the year ending June 1983. It was Rs. 127 crores the previous year. The net profit is likely to be higher at Rs. 15.75 crores, Mr. Oswal added.

AMORPHOUS SILICON FROM RICE HUSK

Ordinary rice husk may be used to prepare amorphous silicon material used in the manufacture of solar photovoltaic cells to convert sunlight into electricity.

A team of engineers from the Institute of Technology, Bombay, has found a way to turn rice husk into a gaseous compound of silicon and hydrogen called silane.

Rice husk, when burnt, leaves behind a residue containing about 15 per cent silica. This is purified by boiling it in acids, a process called acid leaching.

After a purity of about 99 per cent is achieved, it is converted into a compound of magnesium and silicon. This is hydrolysed to produce a silane and disilane gases. The mixture is then separated into pure silane gases through fractionation.

All the silane gas currently produced in the country is being used at about Rs. 1000 per kilogram. Silane from the rice husk can be produced at only about Rs. 100 per kilogram, H. N. Acharya, team leader, said.

The country today uses about 15 tonnes of silane annually. This is expected to increase in the next few years, Acharya said.

GEAR SUPPLY TO MGCC REVIEWED

Suppliers of mechanical equipment to the Maharashtra gas complex (MGCC) being implemented by the State-owned Indian Petroleum Corporation Ltd. (IPCL), are being asked to stick to the delivery schedules.

A review of the public works for supplying equipment to MGCC is being undertaken by the Secretary, Department of Chemicals and Fertilisers, Mr. H. K. Khan. He is also supplying these equipment to Heavy Plates and Vessels, Bharat Heavy Engineering Ltd., Bharat Heavy Engineering Bharat Pumps and Compressors, Bridge and Roof.

Graphite unit coming up at Palamau

140 lakh graphite plant with an capacity of 1,500 tonnes coming up at Bishnupur in district in Bihar.

Jharkhand State Mineral Development Corporation (BSMDC), entrusted with the project, has already acquired about seven acres of land in Palamau for the purpose. On completion, the plant was expected to utilise 1000 tonnes of flaky graphite and 1000 tonnes of amorphous graphite, the chairman-cum-managing director, C. S. Jha said in Ranchi on

Jha said there was a proposal to set up a special quality graphite unit for which required knowledge already been acquired from National Metallurgical laboratory, Jamshedpur and Regional Research Laboratory, Bhubaneswar.

The product could be used in making pencils, electrodes, brush-bonders and sintered products. In this unit, the corporation had taken over four graphite mines located at Bishnupur, Manasoti, Ranka and other mines, all in Palamau district,

the largest reserve of graphite in the state.

FRENCH METHOD TO DETECT CHEMICAL POLLUTION IN WATER

A French company is making use of trouts to detect accidental chemical pollution in water.

The company has recently brought into the market a unique apparatus for detecting chemical pollution in water. The pollution detector comprises a funnel 50 cm in diameter which releases the water to be checked. A small trout swims in the funnel, upstream, at the surface. If there is any pollution in the water, the fish dies and is brought downwards by the circulating water. When it blocks the funnel's drain, an alarm is triggered off.

The trout reacts to sudden accumulation of small amounts of pollution which would otherwise escape unwarned, says a release of the French Scientific Information Centre New Delhi.

This apparatus can be installed by the inlet and outlet of drinking water

treatment plants and at the outlet of industries discharging water into the natural environment.

NETHERLANDS, INDIA PACT ON ENVIRONMENT

India and the Netherlands in January 18, signed a memorandum of understanding on environment envisaging co-operation in the fields of environmental management, hygiene, technology and conservation.

The MoU also provides for setting up a joint working committee consisting of an equal number of representatives from both countries. The committee will meet once a year to formulate detailed plans of action.

The MoU provides for scientific exchange of information, data and personnel and this exchange will lead to specific projects in the area of environment.

It also provides for consultancy services, design, testing and realisation of technical facilities, provision of equipment and co-operation between organisations in India and the Netherlands. The projects which will be evolved will be financed under the bilateral aid agreement.

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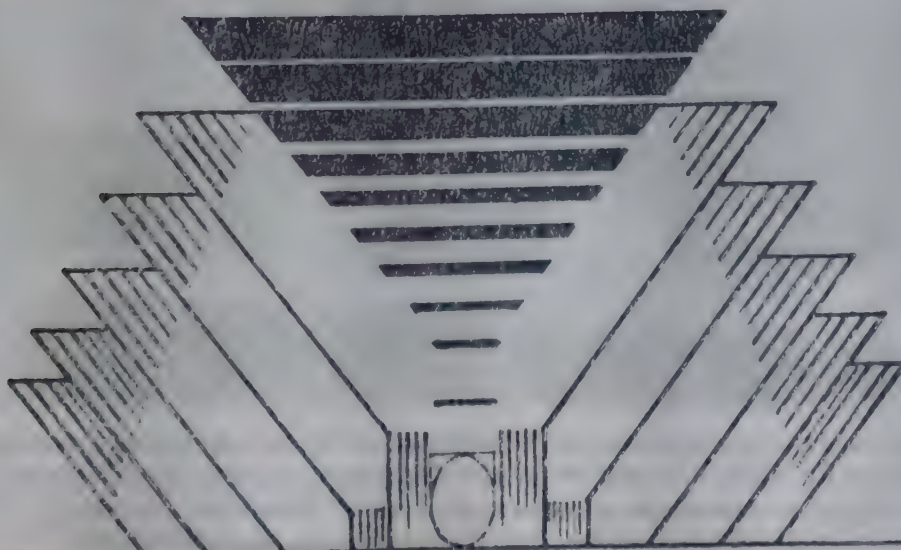
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IIChem.E Seminar on Technological Upgradation

Shri Amarsinh Chaudhary, Chief Minister of Gujarat State, in his inaugural speech, stated that technology upgradation is a must for sheer survival of an industry. He emphasized that technology in India has to be appropriate in terms of the capacity of our economic resources. He added that it is more relevant for developing countries because it is the non-availability of technology which kept them in perpetual backwardness. He mentioned that technology upgradation has to start right from the design stage through installation, operation, maintenance, quality control, packaging, handling, transportation etc.

He reminded that for a developing country like India, for achieving faster rate of economic growth and to catch up with the developed nations, certain sectors must go for the sophisticated technology immediately. He added that some industries viz. Distillery, Caustic, Chlorine, Sulphuric Acid, Paints, Pesticides etc. would need immediate upgradation in technology. He emphasized that there is a need of developing state-of-the-art technology to upgrade performance of equipments as well as processes on a continual basis.

He was inaugurating the National Seminar on "Technology Upgradation" at Ahmedabad on 6th January organised by the Indian Institute of Chemical Engineers, Ahmedabad Regional Centre, Industries Commissionerate, Government of Gujarat and Department of Scientific and Industrial Research, Ministry of Science & Technology, Govt. of India. The Seminar was co-sponsored by Anup Engineering Ltd., Cibatul Ltd., Deepak Nitrite Ltd., Engineers India Ltd., Gujarat Alkalies & Chemicals Ltd., Gujarat Carbon Ltd., Gujarat

State Fertilizer Co. Ltd., Gujchem Distillers India Ltd., Oil & Natural Gas Commission.

In his speech, Chief Guest, Shri R.K. Jaichandrasingh, Union Minister of State for Chemicals and Petrochemicals, mentioned that over a period of time technologies in the manufacture of various products have undergone substantial improvement relating to operations, improving safety standards, minimisation of emissions and thereby reduction of pollution and increase in safety. He added that the Government was encouraging Foreign Collaboration to bridge the gap in technology. He highlighted that public sector undertakings like IPCL and HOC have collaborated with the National Laboratories to develop new technologies. He made a mention that in the latest Drug Policy various measures for the rationalization, quality control and growth of pharmaceutical industry in the country are taken. He informed that perspective plans for petrochemical industry were ready and similar plans for chemical industry were being prepared. He also highlighted liberalized industrial policies of Government of India.

In the key note address, Dr. S. Varadarajan, Chief Consultant to Planning Commission mentioned that the advances in petroleum and gas have opened up a new vista in the last thirty years. Indian developments in chemical from such sources have received considerable impetus by the large increase in the production of oil and gas in the western offshore and onshore as well as in the Northeast.

He added that the traditional organic chemical industry based on natural raw materials

has continued to function. This in fibre from cellulose, alcohol base glucose from starch, benzene, pthalene from coal tar, perfume and castor oil derivatives. The growth in chemicals in India may continue in the next fifteen years.

There a number of developments in science and technology internationally are leading to entirely new products. The upgradation of technology in Indian Chemical Industry should be considered in the context of international trends and of the need for Indian industry to be at a comparable level in quality, cost and standards. The improvement and development of such technologies are paramount.

He analysed technologies being developed in different sectors of chemical industry in India and abroad. He suggested a plan be drawn for the upgradation of chemical industry. He suggested that some sectors of chemical industry be given priority on several factors, including energy, environmental impact, conversion efficiency, production and maintenance, obsolescence removal and new technology. He suggested that Chemical Engineers should be imparted knowledge of biotechnology that we can exploit biotechnology in upcoming science.

Earlier Shri Arun P. Sheth, Chairman, Indian Institute of Chemical Engineers welcomed the participants.

Shri A.K.A. Rath, Hon. Secretary, IICHE, ARC, presented a vote of thanks.



(L to R): Shri M.C. Chhabria, Vice Chairman; Dr. S. Varadarajan, Chief Consultant, Planning Commission; Shri Arun Sheth, Chairman, IICHE, ARC; Shri Amarsinh Chaudhary, Hon'ble Chief Minister of Gujarat; Shri K.V. Bhanujan, Industries Commissioner of Gujarat; Shri A.K.A. Rath, Hon. Secretary, IICHE, ARC; Shri A.K. Jaichandra Singh, Union Minister of State for Chemicals and Petrochemicals.

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COMMERCIAL ENERGY SECTOR:

Long-Term plan advised

The Planning Commission has suggested a 15 to 20-year long-range plan for the commercial energy sector rather than a short five-year one in view of the long gestation period for the completion of projects.

This is all the more necessary to match the reserves of primary energy sources, their exploration and exploitation through new technologies against the time horizon of expanding demands in the main sectors of the economy.

For the north-east, which is rich in hydrocarbon, hydel and coal resources, the commission has stressed the need for drawing up an integrated energy plan.

In planning for rural energy needs, the commission has suggested decentralised area planning because of wide variations with regard to accessibility to energy sources, income levels and food and social habits. An optimal mix of various forms of energy to meet the area demands has to be planned in

detail, according to a mid-term review of the Seventh Plan.

The commission has also suggested the launching of a nation-wide energy conservation campaign, energy audit and suitable incentives for energy conservation.

Efforts in this direction have been marginal in the first half of the Seventh Plan period, says the review.

The potential for energy conservation by way of better house-keeping, retro-fitting of existing boilers and other devices, replacement of inefficient equipment and technological changes is considerable.

The review says the Petroleum Conservation Association has identified some areas for conservation of petroleum products, leading to fuel saving of Rs. 125 crores in the industrial sector alone.

The Bureau of Industrial Costs and Prices (BICP) has taken up detailed energy audits of six major industries

— aluminium, cement, fertilisers and petrochemicals.

The commission has called for an integrated energy pricing policy taking into account international market possibilities.

BODY FOR NUCLEAR SCIENCE GROWTH

The Indian Nuclear Society, a 'body' on the lines of the Nuclear Society, is being set up in Bombay, with a group of consultants and engineers from different disciplines, to promote advancement of nuclear science, engineering and technology in the country.

Announcing this, the President, Mr. Ramanaiah, told that the society — which was formally inaugurated by the Prime Minister, Mr. J.R.D. Tata — will provide a forum for an objective exchange of ideas among different sections of the nuclear community and also between the community and the public.

INS, which already has scientists and engineers enrolled as life members, has plans to enrol corporate members. Ramanaiah said adding the society would invite membership from academic institutions, hospitals, industries engaged in the manufacture of nuclear equipment and components besides individuals from Government departments and agencies.

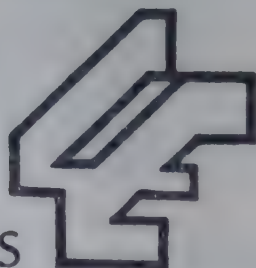
Apart from Dr. Ramanaiah, a leading scientist in the Atomic Energy Division of the Atomic Energy Board, INS has Mr. S. S. Sanyal of the Department of Atomic Energy's safety review committee as its Vice-Chairman and Mr. K. V. R. R. Iyer, Associate Professor at the Institute of Technology's nuclear engineering laboratory at Powai, as its Secretary. A. Kakodkar of the Bhabha Atomic Research Centre's nuclear engineering division as its Treasurer.

INS would also aid in several disciplines allied to nuclear field, encourage research, publish scholarships, grants and co-operate with Government departments, educational institutions and organisations.

The nuclear society, which will chalk out its future course of planning to hold its first annual conference by the end of this

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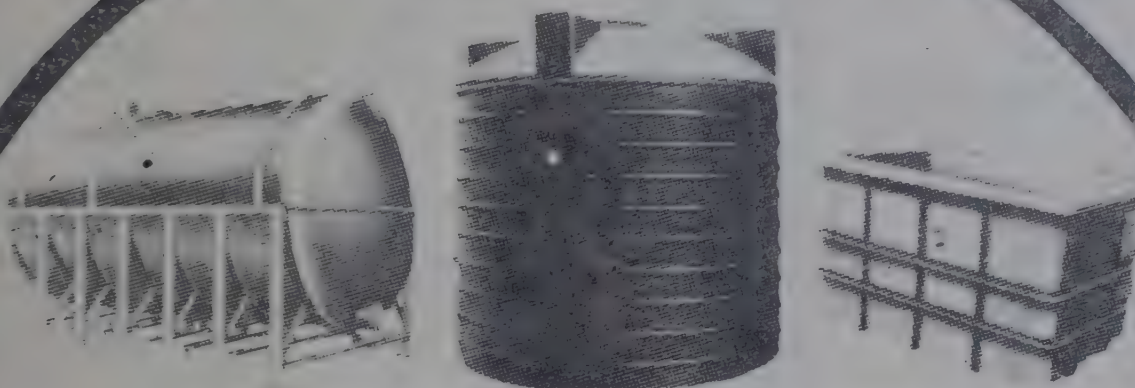
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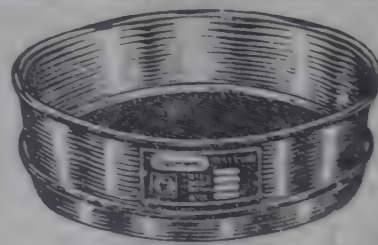
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Highlights in Chemical Technology

(Part 2)

CONDUCTORS UPDATE CURRENT SERVICE ON CONDUCTIVITY MOOTED

International, the scientific technical information network, recently announced the publication of a new printed current awareness service, Superconductors Published every other year, this new service will provide information on all superconductors papers, published world-

wide, it will provide bibliographies from patent documents and other non-journal items which are publicly available. STN International is the on-line network cooperatively by the ACS, Information Centre of Science and Technology and Fachinformationszentrum Energie, Physik Mathematik (West Germany). This year's subscription price for the service will be welcomed by scientists round the world, who are eager to make high temperature superconductors.

FORWARD STEPS BY THE GOVERNMENT TO SUPPORT RESEARCH FOR HIGH TEMPERATURE SUPER- CONDUCTIVITY

In the competitive quest to be the leader of superconductivity research, the American Government and other nations are taking two new steps.

The first, Argonne National Laboratory has been commis-

sioned to produce within the next 5 years, a practical conducting wire that loses all resistance to electrical current at liquid nitrogen temperatures (-190 deg. C). The new project will aim at producing a flexible wire about one-seventh of an inch thick and able to carry about 100 amperes of current when cooled by liquid nitrogen.

As data and information are crucial for any fast-moving research programme the US Department of Energy is setting up a computerized data base to help US scientists keep pace with rapid development's in superconductivity research. The DOE would use its existing computer facilities to start with, and expand upon them.

Work has already begun on a network to coordinate the exchange of information among researchers. It will be broadened and made available to the commercial community and the Federal agencies. The database will provide on-line access to data, bibliographic data bases and research in progress. The information will of course, be available through electronic mail.

A NEW FIBRE-REINFORCED CONCRETE UNVEILED BY KAJIME CORP. OF JAPAN

Kajima Corporation, a major Japanese construction company has recently unveiled a new construction material which is reported to be stronger, lighter and more durable than ferroconcrete. The new material (FRC) was developed in collaboration with Arisawa Co., a fabric manufacturer of Nigawa, Japan. The FRC is manufactured by fabricating

carbon fibres, and is more than 10-times stronger than existing ferroconcrete. The FRC is also reported to be free from rusting or erosion. It can be used for materials to build facilities for housing atomic reactors. The new materials will be ideal for construction of high rise buildings in the future. (*Japan Chem. Week*, 9/24/87, p. 5).

A NEW ECONOMICAL SYNTHETIC METHOD FOR BULK PRODUCTION OF METHYL JASMONATE

Nippon Zeon of Japan is a world leader in synthetic fragrances. The company has developed in the past various fragrances such as leaf alcohols, leaf ester, delta-lactone, prenyl acetate, methyl dihydrojasmonate etc. It is the world's biggest producer of leaf alcohols.

The company has recently developed a new economical synthetic method for bulk production of methyl jasmonate (Trade Name: Jasmonol). Methyl Jasmonate is produced by quite a few companies. The new synthetic method (using a new highly functional catalyst) developed by Nippon Zeon, however, can reduce cost to one-third of that required by the conventional methods.

Nippon Zeon is planning to invest 1.3 billion yens in the construction of plant for bulk production of 50 tons of methyl jasmonate per annum. Methyl Jasmonate is one of the constituents of natural jasmine oil. (Jasmine absolute), called the queen of flower fragrances. It has a soft and elegant aroma reminiscent of jasmine petals. It can be used for pro-

ducing natural jasmine fragrance in perfumes. (*Japan Chem. Wk.*, 9/24/87, p. 10).

A NON-RIGID FLUORO-RESIN DEVELOPED BY ASAHI GLASS (JAPAN)

Asahi Glass Co. has recently unveiled a new non-rigid fluororesin under the trade name 'Softlon'. The new product -- a polytetrafluoroethylene (PTFE)-type polymer -- has excellent properties peculiar to ordinary fluoro resins and is also endowed with rubber softness free from self-adhesiveness. It stands between synthetic resin and rubber in terms of chemical/physical properties.

Softlon has high mechanical strength, electrical insulation properties and tough resistance against chemicals, weather, radio-active rays, cold, heat and abrasion. In addition it has high temperature strength and is superior to perfluoro elastomer in physico-chemical properties. PTFE is reported to have the highest degree of non-rigidity among fluoro-resins. It has excellent sliding properties, but is inferior in sealing capability. Fluoro rubber is so adhesive that it cannot be used in rotating parts. Softlon is a result of the company's research endeavour to pioneer new material having the advantages of the products without their shortcomings.

The company is contemplating exploiting applications fields for the product by taking advantage of its non-rigidity, sealing properties, low level creep characteristics and high stress-relaxing properties. It will probably be used as mobile parts which are required to have superb sealing properties and produce little revolving torque.

The company will market the new resin in the form of rolled products

since processing of the resin calls for unique technical know-how. Other forms also will be developed in collaboration with users. (*Japan Chem. Wk.*, 10/22/87, p. 3).

A POLYMER WITH FIRM MEMORY FOR PAST SHAPES DEVELOPED BY KURARAY CO.

The Japanese fibre producer Kuraray Co. (Osaka) has recently unveiled a polyisoprene based compound that removes the past -- more exactly the 'shape' it had in the past. The material flip-flops between two different shapes, depending on the temperature to which it is heated. The company reports the substance can be used as a pipe joint, in architectural applications, as a cast in medicine and in toys.

The polyisoprene-based compound is a modified version of the firm's TP-301 trans-polyisoprene rubber, and consists of a mixture of crystalline (36% by volume) and amorphous (the remainder) phases. The compound, which costs about \$42/kg, also contains a sulfur-based cross-linking agent, a filler and an absorbent for U-V rays.

The polymer is taught to remember its 'high temperature shape' by first heating it to about 100°C (for 20 min). The finished material switches to its molded shape above 67°C, the crystalline polymer's melting point. This changeover can happen quickly -- when the temperature is above 90°C, the time frame is about a minute. The firm says that these changes can happen a few hundred times before the compound loses its memory. (*Chem. Eng.*, 10/12/87, p. 20F).

A NEW ECONOMICAL PRODUCTION ROUTE FOR ADIPIC ACID

Asahi Chemical Industry Co. has developed a new production method

for adipic acid. This process is reported to cut down on consumption of benzene and thereby making the process economical.

In the new process, cyclohexene is produced through hydrogenation of benzene and is transformed to cyclohexanol via a hydration process. Adipic acid is produced from cyclohexanol using a nitric acid oxidation process.

The new process is reported to cut down on unit consumption of benzene and hydrogen by more than 30%, thereby reducing production costs. The company is considering building a cyclohexanol plant based on the new process. The company is also striving to improve upon the nitric acid based process for its coming acid plant.

Asahi Chemical has also developed a new production method for hexamethylenediamine, which -- as well as adipic acid -- is a raw material for nylon-66. The new process is claimed to reduce production costs by 10% without using ion-exchange membranes, which is employed for the traditional method. (*Japan Chem. Wk.*, 10/29/87, p. 5).

LIGNIN -- A CORNUCOPIA OF CHEMICALS -- POSING A MAJOR CHALLENGE TO CHEMICAL TECHNOLOGISTS

Lignin is the main component of wood after cellulose. It is an untapped chemical resource for the future, and provides a great challenge to chemical technology. It is also the main waste product of the pulp industry, which disposes of 30 million tons of lignin annually at present although, there are a number of minor uses for lignin, most of which are or dumped into rivers. The

lignin such as lignosulphate from the sulphite process, is a good adhesive and protective material. Their chemical inertness to water and oxidation make them suitable for using in cement. Lignin is the food-flavouring for vanilla. Although, vanillin is the most popular food flavouring in the world, it accounts for little of the lignin produced.

Lignin constitutes about a quarter of Earth's biomass produced on land. Lignin could release a cornucopia of chemical feedstocks and many organic compounds to rival the present oil-based chemical industry. The problem is that lignin is chemically inert, making it difficult to break it for producing chemicals. However, chemists, as well as biologists, are trying to find ways of breaking down the structure of

like most biological polymers (such as DNA, proteins and carbohydrates), lignin has a random (hazardous) chemical structure. It is a three-dimensional matrix of benzene rings and short chains of atoms, called phenylpropane units ($-\text{CH}_2-\text{CH}_2-\text{C}_6\text{H}_5$), with occasional oxygen bridging atoms between link. Attached to the benzene rings, however, are hydroxyl and methoxy (CH_3O) groups, which make the benzene rings rich in electrons. Under certain circumstances, these electron-rich rings can be useful in activating the breakdown of lignin into useful chemicals.

The structure of lignin is so stable and inert that it can resist most of the natural agents of plant life. The main constituents of lignin are benzene rings, so lignin could provide industrially important aromatic compounds normally obtained from oil, such as benzene, toluene, and ethyl

benzene. These are essential bulk chemicals, which are precursors of plastics such as polystyrene, fine chemicals and dyes. However, breaking down lignin into simple compounds is difficult. The current way of breaking down lignin requires high temperatures and powerful oxidants that destroy the sensitive degradation products.

A far better approach is an electro-chemical route recently developed by Jim Utley, at Queen Mary College, London. This method uses electricity to break down lignin. It works at lower temperatures and under milder reaction conditions. The Utley method dissolves lignin in aqueous caustic soda and then passes an electric current via a special nickel electrode, shaped like a Swiss roll. This provides a high surface area for reaction and allows the degradation products to be collected more readily.

At the moment, the main products from this electro-chemical process are vanillin and phenolic benzaldehydes, such as 4-hydroxybenzaldehyde. The latter is a potential intermediate for pharmaceutical and plastic industries. But more exciting will be the prospect for controlled electro-chemical degradation to break down lignin into short chain polymers of low-molecular weights that could be used, in the manufacture of detergents, adhesives and metal-sequestering agents. This process, according to Utley can one day yield commercially valuable chemicals from lignin.

Another approach is to breakdown lignin by using enzymes from the fungi, like *phanerochaete chrysosporium*, (better known as the white rot fungus). How this fungus attacks lignin molecule is a fascinating chemical story (*New Scientist*, 16th May, 1985, p. 16) which is still unfolding. The hyphae of the above

fungus release an enzyme called ligninase, which does not act like an ordinary enzyme. It does not bind to a specific substrate. This lack of specificity is the reason why biochemists took so long to discover it. Researchers at John Palmer's Laboratory (Imperial College, London), report that ligninase works by 'firing' at lignin highly reactive chemical fragments called radical cations.

In conjunction with hydrogen peroxide produced by the fungus, these radical cations act like dum-dum bullets. As they near the electron-rich phenyl propane units, they cause them to ionise to form new radical cations. These in turn, grab electrons from phenylpropane units, further into the structure, ultimately causing the tough carbon-carbon and carbon-oxygen bonds in lignin to collapse. Thus, with the help of peroxide, ligninase causes devastation out of all proportion to the small number of chemical bullets it fires.

It is as yet too early to predict whether the biotech breakdown of lignin (described above) will lead to the creation of a new chemical industry based on biomass. For industrial purposes, it is virtually impossible to prepare ligninase on a large scale as yet.

Also, it does not have the chemical stamina to withstand the bulk production of chemicals. Ligninase also needs to be genetically altered to perform the exact reactions that biotechnologists desire. (*New Sci.*, 10/8/87, p. 40-41.).

SUPERIOR SILICON SEMI-CONDUCTORS & ELECTRODES WORKING AT HIGH TEMPERATURE BASED ON BORON NITRIDE

One of the major drawbacks of silicon semiconductors is that they do

not work at temperatures above about 200°C. But Japan's Tsukuba-based National Institute for Research in Inorganic Materials (NIRIM) has developed four sample diodes made of cubic boron nitride that, it says, perform the function of semiconductors at temperatures upto 650°C.

The next step, report researchers, would be to develop electrode materials that can withstand equally high temperatures; a task NIRIM reports, it will not tackle alone. If that is successful, the cubic boron nitride diodes can be used in space, in nuclear reactors and in other hostile environments. Another project that NIRIM has yet to investigate is towards development of cubic boron nitride for use as light emitting bluish-purple diodes. (*Chem. Wk.*, 11/4/87, p. 53).

AN UPDATE ON MALIC ACID AS A NEW FOOD ACIDULANT AND ORGANIC ACID FOR FOOD TECHNOLOGY

Malic acid (Syn: Hydroxysuccinic acid, apple acid) in recent years has become a popular food acidulant in affluent countries, next only to citric acid. It should not be confused with maleic acid, a highly poisonous acid. Malic acid occurs naturally in several fruits such as unripe apples, goose berries, cherries, raspberries, tomatoes, etc.

Malic acid's main outlet is soft drinks, which occupy 80% of its annual demand over 3000 tons in Japan alone. Lately, it has taken significant studies as a popular food acidulant in Japan and USA.

New uses for malic acid processing are developing progressively. For example, two new ones have cropped up in food processing. Malic acid has proved a good complement to aspartame sweetener. Malic acid makes aspartame taste more like sugar, so users of aspartame also demand malic acid.

This may swing demand for malic acid up by several thousand tons a year in affluent countries consuming aspartame. Another new use for malic acid is as a pH regulator at improving food quality, e.g., employed as a pH regulator in noodles, thus replacing hydrogen peroxide.

Malic acid in view of its high demand has not yet become popular in food processing industry. (*Chem. Wk.*, 11/12/87, p. 6).

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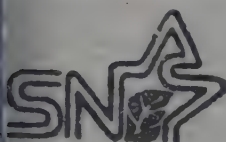
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Recent Developments in Separation Processes for Biotechnology

R.N. GOKARN and S.V. KHADKE
(Chemical Plant Divn., Larsen & Toubro Ltd., Bombay)

Biotechnology, as an integrated application of biology, microbiology and chemical engineering is a good example of need for co-operation between disciplines. Of late, public attention has been focussed more and more on the field of biotechnology and hopes are being placed at present in the technological and genetic engineering.

Considerable efforts are being made by scientists, biologists, biochemists all over the world to optimise the biotechnological process. Parallel to this, efforts are also being made by machinery manufacturers to update and modernise bioengineering. Engineering firms are focussing attention on improved fermenter designs, improved separation/extraction techniques and downstream processes with following objectives:

- achieve better yields
- improve continuity of process
- minimise space requirements
- reduce operating costs.

This paper discusses how steps have been taken for combining two stage process of separation and extraction into a single operation by converting ordinary filter centrifuge into extraction decanter by leading foreign manufacturers like M/s. Westfalia Separator AG, West Germany.

WHOLE BROTH SOLVENT EXTRACTION

Large scale production of antibiotics broadly consists of fermentation, extraction and crystallisation steps. The fermentation process lasting about a week, the antibiotic is formed by specific micro-organisms dissolved in a nutrient medium. It is then present in a dissolved state or partially combined with solids and must be isolated as quickly as possible to avoid clogging in the extraction decanter or loss of valuable product. After clarification of the fermentation broth in rotary drum filters and centrifuges, in many cases a readjustment of pH value follows immediately before extraction.

Extraction, which causes, for example in the case of penicillin, flocculation of proteins and subsequent deposition in the extractor.

"Whole broth extraction process" aims at overcoming these problems by combining solid separation and extraction in a single operation using countercurrent extraction decanter.

COUNTER-CURRENT EXTRACTION DECANTER (Refer Fig. 1)

Generally biotechnological process starts from fermentation followed by filtration, extraction, precipitation and so on. The filtration stage has certain disadvantages in the processing sequence such as:

- a) relatively large space requirement
- b) problem of filter blockages by infected fermentation broth,
- c) a loss of effective substance of the order of 5-15% in the filter,
- d) solids contamination during extraction and blockage of extractors, despite expensive prefiltration.

This filtration step can be completely eliminated if counter-current extraction decanter is used.

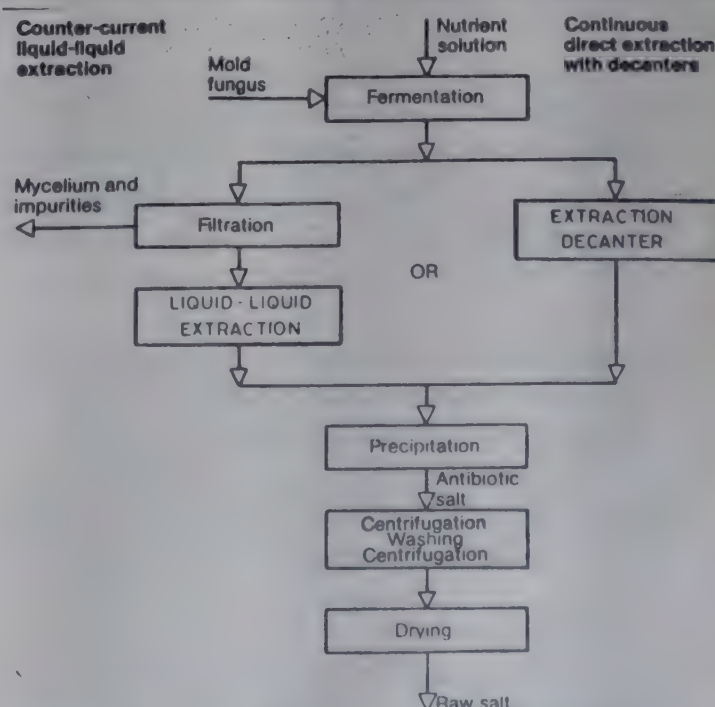


Fig. 1. Whole Broth Extraction In Antibiotic Process

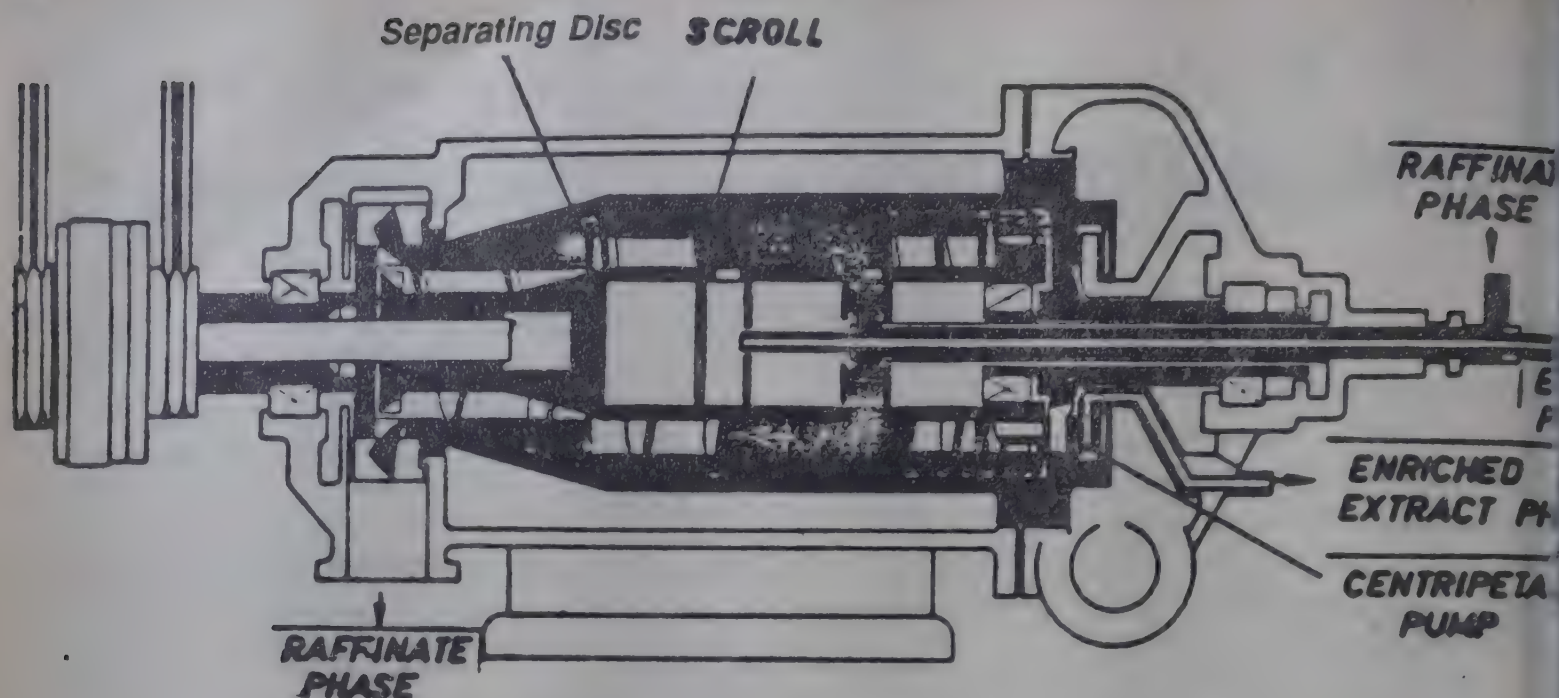


Fig. 2. Decanter for Continuous Counter-Current Extraction

The whole broth is fed, through the outer centrally arranged feed tube (Refer Fig. 2) to the three meter long extraction zone. The solvent phase is also fed into the rotating bowl but at a different location, so that the feed and solvent flow counter current to each other in the extraction zone. The separation takes place in each side of the extraction zone. The interphase between the separated phases can be adjusted for variable liquid densities by means of a ring dam at the cylindrical bowl end. The enriched solvent (light phase) is discharged under pressure by inbuilt centri-petal pump. Depending on the design of the scroll, it is possible to use solvents having specific gravity greater or less than that of broth. The raffinate phase with solids discharges at the conical end of the bowl.

PROCESS SEQUENCE

Many antibiotic extraction process require three to four theoretical stages of separation. Since each counter-current extractor decanter can give upto two theoretical stages, these are usually arranged in series (Ref. Fig. 3) once again in counter current fashion to achieve high yield, high washing efficiency and high purity.

In the processing cycle, the full contents of fermenter are fed directly to the first extracting decanter where they are brought into contact with already slightly enriched solvent from the second decanter stage. In some cases, it is necessary to add a wetting agent or to mix part of solvent with the broth before the pH value is adjusted.

The fermentation broth from the first extracting decanter is then fed to the second stage extraction with fresh solvent in second decanter. It is further processed

for recovery of the solvent by distillation and biological and mechanical effluent treatment.

The solvent enriched with active substance from first stage can be subsequently clarified, washed in a centrifugal clarifier if required. Further depending on the quality requirement, further purification or direct crystallisation from the solvent is out.

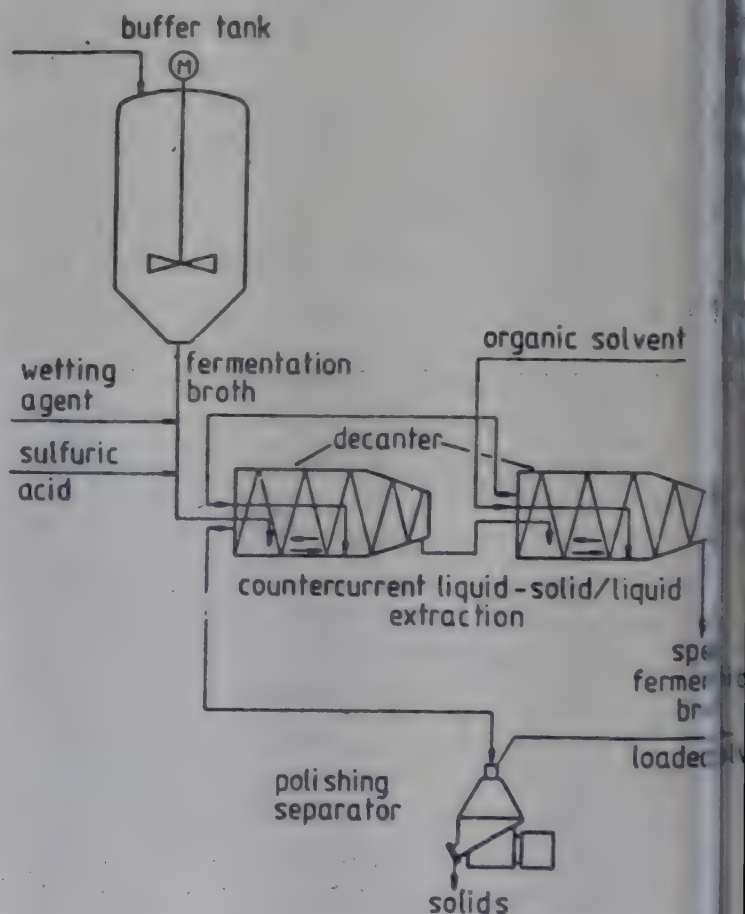


Fig. 3: Process Sequence of Direct Extraction

AGES OVER CONVENTIONAL SES

the extraction decanter has resulted in a series
vements in the conventional process (using
filter and podbielinak extractor) of antibiotic
. Data available on losses at various stages of
onal antibiotics plants shows following:

um losses resulting from vacuum filtration are
< 5-15%
y losses through decomposition of the antibio-
the way to extraction are approx. 3%
n the extraction process, yield losses of about
hich are unavoidable.

case of direct extraction, due to omission of
filtration, about 15% extra yield can be achieved.
broth is fed directly into the extraction system
diversions, it is also to be expected that the sta-
ses will be halved by the new processes, result-
further 1-2% increase in yield. The increased
eans considerable additional income. Besides
improvements, direct extraction system also
s much lesser space and saving on filter aids.

ncclusion, direct extraction process by means of
on decanter has the following advantages:

- num space requirement.
- oved process continuity.
- er total yield (losses in filter cake are avoided).
- ngs in operating costs because no filter aids are
led.
- danger of infection.
- suspension to be treated is not diluted by wash
er for the filter cake, as a result there is a reduced
irement for extracting agent.
- s strain placed on the extraction process.
- s pollution of waste water.

- Lower consumption of wetting agents.
- Lower consumption of acid or lye.
- Lower quantities of waste water.

APPLICATIONS FOR WESTFALIA DIRECT EXTRACTORS

The main field of application is the pharmaceutical
industry for the extraction of antibiotics, such as peni-
cillin, erythromycin, tetracycline, etc. from fermentation
broths and for the recovery of vitamins, such as B12,
A and C, and the extraction of alkaloids, such as qui-
nine, codeine, morphine, caffeine, strychnine, etc.

CONSIDERATION OF ECONOMICS

The financial adantages of this new technology can
be demonstrated by a consideration of economics.

For 1000 tons/annum penicillin capacity plant:

Present loss of yield due to instability, filtra- tion and old method of extraction	...	5-15%	= 50-150 tons/year
Direct extraction gives extra yield of atleast	...	5%	= 50 tons/year extra production = Rs. 100 lakhs additional per year @ Rs. 200/kg penicillin price.

Approximate investment for 1000 T/A direct extrac-
tion plant is Rs. 80 lakhs. This means that the invest-
ment is amortised within a year and rich dividends can
be reaped in all future years. Besides this, there is a tre-
mendous amount of savings in filter aid, labour cost, sol-
vent and other chemicals.

Based on the above discussions, it is clear that whole
broth solvent extraction technique developed by M/s.
Westfalia Separator AG, is the Process of the Future.

Customer	Equipment
Arlem Breweries Ltd., Goa	Fermenters (15m ³)
Associated Breweries & Bottling Ltd., M.S.	Fermenters (16m ³)
Indian Yeast Co. Ltd., Maharashtra	Fermenters (40m ³)
United Breweries Ltd., Karnataka	Outdoor Fermenters (61m ³)
Maize Products, Ahmedabad	S.S. Fermenters
Pfizer Ltd., Bombay & Chandigarh	S.S. fermenters, S.S. innoculum tank, vessel with agitator
Synbiotics Ltd., Baroda	S.S. Fermenters
Citurgia Biochemicals Ltd., Bombay	S.S. Fermenters (225m ³)

Fig. 4: Partial Reference list of Fermenters supplied by L&T

OTHER DEVELOPMENTS IN INDIA

Fabrication capabilities of L&T are well known. L&T manufactured and supplied many industrial fermenters to pharmaceutical industries. Fig. 4 shows a partial references list as an illustration.

Another important indigenous development has been that of continuous sterilisation system incorporating spiral plate heat exchangers which allow 6-80% heat recovery, safer sterilisation with shorter preparation time, compared to batch sterilization. Fig. 5 shows a typical sterilisation scheme. The broth is pumped from feed tank to the regenerator. There, the broth gets heated by exchanging heat with incoming sterilized broth. The

heated broth is then fed into a steam heater where steam indirectly heats the broth upto sterilization temperature. This broth is held at sterilisation temperature for few minutes in the holder. Thereafter, the sterilized broth flows counter-currently with incoming unsterilized broth in a regenerator and thereby loses heat. The cooled broth from the regenerator then is cooled by product cooler where it gets cooled to fermentation temperature prior to entering fermenter. This would result in 60-80% heat recovery.

In conclusion, it can be said that considerable progress is now available in terms of equipment design in bioengineering to harness the biotechnology for several new industrial applications.

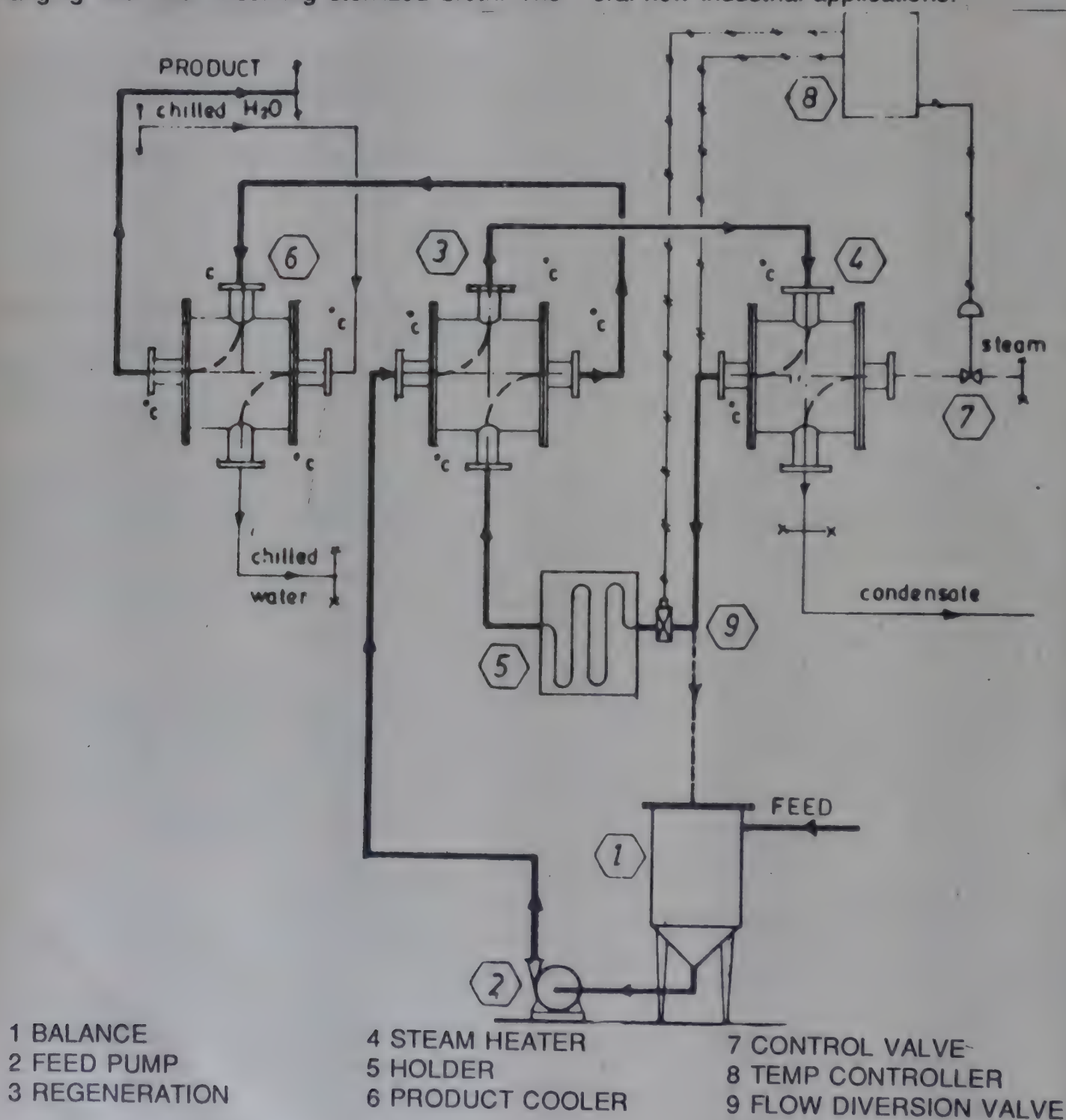


Fig. 5: Continuous Sterilization System

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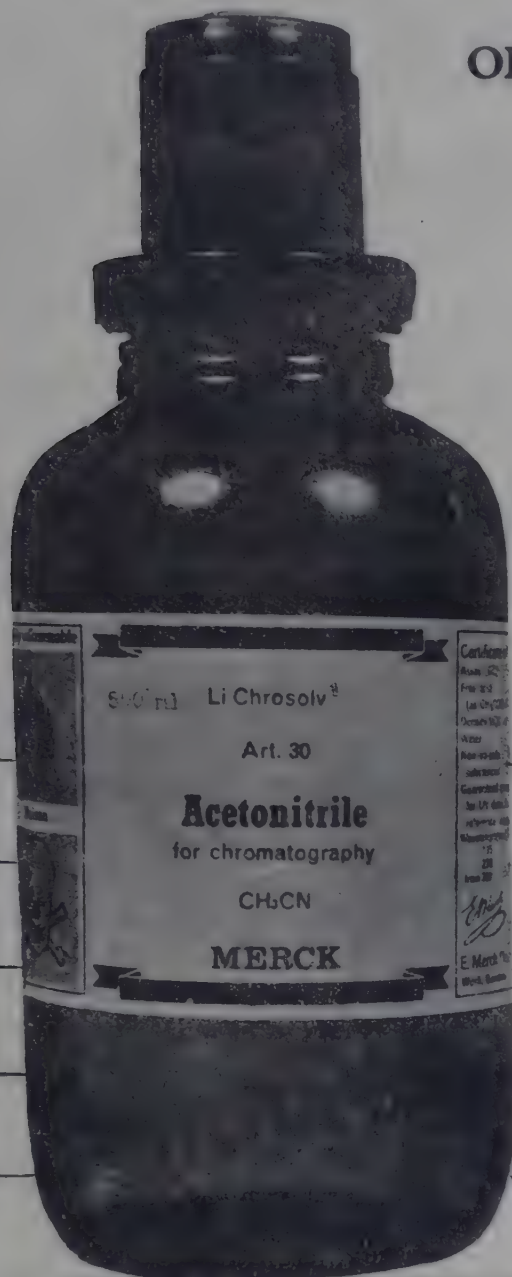
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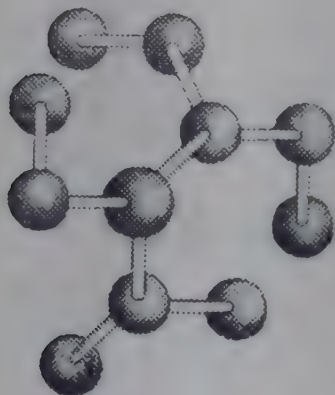
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MRL Blueprint for diversification

The public sector Madras Refineries Ltd. has prepared an ambitious diversification plan for producing aromatics at a cost of Rs. 840 crores to meet the petrochemical needs of the country.

According to Mr. V. R. Deenadayalu, Chairman and Managing Director, Madras Refineries Ltd., the project, for which a letter of intent has been issued by the Union Government, will catapult MRL into a mega-corporation.

In an interview with *Petroleum Asia* journal, Mr. Deenadayalu said the refinery is also considering various options for separation and conversion of mixed C-4 stream containing butanes and butylenes. The diversity of chemicals, obtained as a result of this project implementation can trigger tremendous downstream development.

This has created an urgent need for MRL to start forthwith market research activities aimed at providing a comprehensive picture of the end-user pattern, trend projection, demand and supply situation in the country during the next two decades.

MRL, he said, envisages market research activities for ortho-xylene, purified terephthalic acid, benzene, pure polymer grade isobutylene from C-4 stream, proposal for separation/conservation of C-4 stream containing butylenes.

MRL proposed to conduct these activities urgently despite the diversity of the end-use pattern and newness of any products in the Indian context. MRL is also proposing to identify products for seed marketing.

MRL also intends installing facilities for the production of 25,000 tonnes per year of food grade hexane. The refinery has already completed a comprehensive primary market survey for food grade hexane in the southern States.

The solvent extraction industry for which hexane is the life-blood has great potential to increase production of vegetable oils which is in short supply in India and the country is forced to import large quantities of vegetable oils at the cost of valuable foreign exchange.

MRL is planning to interact with the solvent extractors, checking the required specifications of the product, ascertaining the prevailing problems and evaluating the suitable mode of package.

The 17,000 tonnes per annum propylene project of the refinery is also in an advanced stage of completion and is likely to be commission by mid-1988.

The Rs. 13.8 crore project, for which detailed engineering and most of the civil and foundation jobs are nearing completion, will produce propylene from LPG through FCC technology. Propylene is the valuable ingredient for producing a large number of downstream petrochemicals.

MRL has also submitted a proposal to the Union Government to increase the lube base stock production capacity from the existing level of 1,41,000 tonnes per year to about 2,70,000 tonnes per year, at an estimated cost of Rs. 110.60 crores.

These future plans include an additional NNP construction unit, PDA unit for bright stock of

50,000 mt, conversion of dant HDS unit to catalytic waxing unit and debottlenecking of certain plants.

MRL has also identified areas which incorporate implementation of a major pilot plant centre and a few pilot plants to support its commercial operations.

The refinery is also taking work in the areas of fuels and conversion of middle distillates. The areas include diversification into petrochemicals and on environmental conservation from refinery pollution.

Mr. Deenadayalu said the emphasis of plans has been towards technology upgrade to enhance productivity from existing refinery units, use of facilities for the improved product mix to combat demand imbalance and competition. The furnace expansion is on the anvil would go towards conserving energy and the hydrocracker would help in the middle distillates, he said.

The plant, he said, has added a co-boiler to the FCC units producing high pressure steam to facilitate use in the plant, thereby integrating new technology into the energy system. (for more Company News p. 93).

Para-xylene and benzene planned for Indonesia

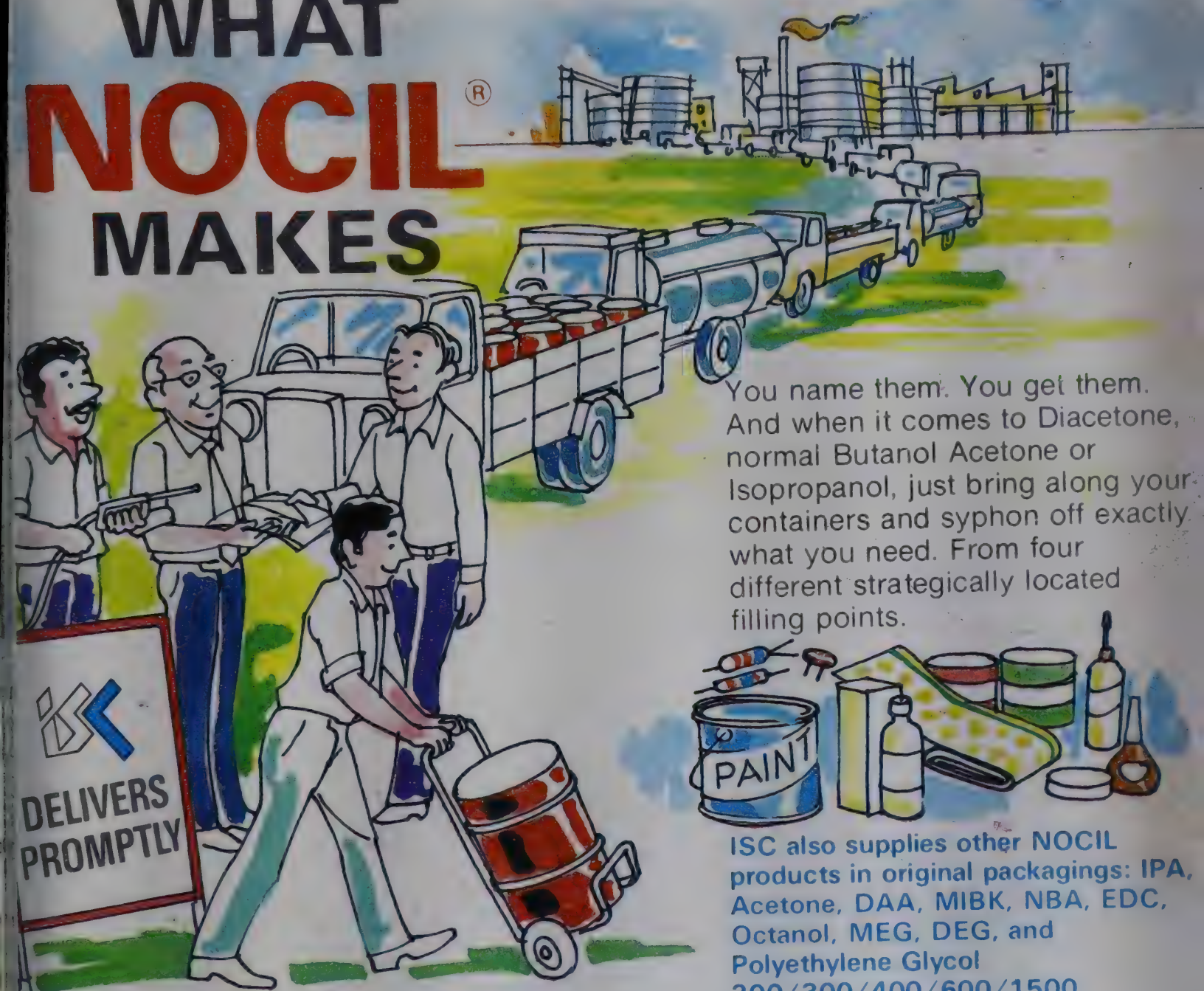
Tokyo-based JGC will build a 270,000-metric-tons/year para-xylene plant and a 123,000-ton/year benzene unit for Indonesia state oil and gas company Pertamina (Jakarta). Completion of plants at Pertamina's Java, refinery is scheduled for December 1990. Japanese engineering company Mitsui helped in financing the \$375 million project.

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INTERNATIONAL LEATHER FAIR IN MADRAS

ggest international leather fair in India so far will be on at the Rajaji Hall, Madras from January 31 to February 6, 1988. The fair is to project the export capabilities of India's leather industry and provide ample opportunities for updating domestic technology and display of sophisticated leather machinery and equipment.

In the series of such fairs, the forthcoming leather fair will be on an unprecedented scale occupying an area of 4200 sq. meters as against 1 to 2800 sq. meters last year. As many as 112 participants will be displaying their wares. The foreign participants include reputed firms from Czechoslovakia, FRG, France, Italy, Taiwan, the UK and others. Some of the wellknown foreign participants are the leading firms such as Bombelli, Bruggi, Fortuna, Lorenzin and Aletti, from FRG, Megcier Freres from France and Strojimport from Czechoslovakia. Italy is taking part in a big way by occupying an area of 1000 sq. meters, according to a TFAI release.

The national sector almost all important manufacturers and exporters of the leather industry will be represented at the fair. The council

for leather exports with whose cooperation the fair is being organised by the Trade Fair Authority of India has ensured maximum possible representation for various sectors of the domestic leather industry including finished leather, garments, travelware and leather chemicals. To ensure business orientation and facilitate serious business negotiations the first four days of the fair are exclusively reserved for business visitors. Even during the subsequent days the pre-lunch hours are reserved for business visits. The entry during the business hours will be regulated by a scheme of business registration.

C.L.R.I. Seminar on Modernisation of Leather Industry

In conjunction with the International Leather Fair, the Central Leather Research Institute (CLRI), Madras is organising the 23rd Taners Get-Together 1988. The theme of this year's meeting is 'Modernisation of the Leather Industry'. The seminar will be inaugurated on January 28, 1988. A brief agenda of the technical sessions along with the role of the CLRI in organising such get-togethers is outlined hereunder.

Tanners Get-Together: A proven forum for Cooperation

K. SATISH BABU and T. RAMASAMI
Central Leather Research Institute, Madras

Get-Together: Its long range objectives

Three years since late Y. Nayudamma envisioned the forum of Taners Get-Together (TGT) to bring together many tanners, leather technologists, chemists, policy makers and scientists with a view to not only exchange scientific views but also to solve the problems facing the leather industry collectively. It was in 1965, the first Tanners Get-Together was held at the premises of Central Leather Research Institute, (CLRI). It has been a meeting place even in 1965 for the tanners and the scientists to discuss the technological problems and seek solutions for such problems together. The TGT formed a pace setter later for many industry-meets which have become popular in sectors other than leather in recent years. The main objective of successive TGT's has been to strengthen an already established CLRI-Industry relationship through the exchange of scientific and technological information.

Nayudamma: His visionary role in conceiving TGT

The Taners Get-Together over the years has provided a valuable forum for co-operative effort in leather research and industry. Late Y. Nayudamma not only conceived of TGT, but also provided the much needed impetus for successive TGT's for several years. His was a total participation which provided a high level of inspiration. The response of the industry for his call for Tanners Get-Together was very high and brought the scientists of CLRI and the industry closer than before.

International Leather Fair at CLRI : An added attraction to TGT

In 60's TGT attracted a vast number of tanners who participated also in the International Leather Fair organised by Indian Leather Fair Society at the Institute Campus. Almost invariably International Leather Fair used to be inaugurated in 1960's by the Commerce Ministers to Government of India. This enabled the Government to appreciate various promotional measures taken by the industry and adopt policies which provided incentives. The period between 1970-75 was one of consolidation for the Indian Leather Industry, "graduating from the position of the export of the raw hides and skins into the export of processed and finished leathers". During this phase, TGT attracted a large international participation and a number of process demonstrations were made by the representatives of many chemical supplier houses. The concurrently run International Leather Fair attracted many international suppliers of machines and equipments for leather industry alongside of technical discussion of improved techniques.

Indian Leather Fair Society : An Ardent Supporter of TGT

The organisation of TGT, a technical symposium at the same time as International Leather Fair in the same campus enabled Indian tanners to assess the technological capability of the machines and equipments exhibited in the Leather Fair in the company of scientists and technologists of the Institute. Similarly, the technological options required for the supply of specific kind of leather to meet the demand of inter-

national buyer could also be examined by the tanners through discussion with R&D staff of CLRI and other participants of TGT. International Leather Fair organised by the Indian Leather Fair Society had been an additional source of strength to the cause of TGT and by scheduling the Leather Fair at the same time and campus at TGT, International Leather Fair added a strong support to TGT as CLRI.

Activities at TGT

TGT being essentially a technical meeting, seminars and demonstrations are given the most priority. The Institute in its desire to obtain feed back information from the industry on the research programs organised a views forum at the time of TGT. In the recent years, panel discussion and poster sessions have become important activities in TGT. Until 1985, at the time of International Leather Fair, there used to be a Fashion Show conducted at the CLRI Campus. These shows provided also a mechanism for the industry and the Institute to project themselves in the public opinion.

Choice of Themes for TGT

Every year a specific theme is chosen, after feedback information from tanners is compiled. This year the focus is on "Modernisation of the Leather Industry".

Participation at TGT

It is of interest to note that subjects like finished leather manufacture, effluent treatment, manpower development etc. found prominence even as early as late 60's and middle 70's. The TGT used to spend as many as seven days for deliberations during the period starting from 31st January every year. The average participation in TGTs in the last 22 years has been of the order of 500 participants.

Changing Scenarios in Leather Industry and programs at TGT

There has been, nevertheless, a minor shift in the emphasis on the structure and composition of the technical sessions in the TGT in recent years. With vast changes in the channels and modalities used for the export of leather and leather products, it has become necessary to organise International Leather Fair on lines with other International Fairs, such as Semaine Du Cuir, Paris and Hong Kong etc. Therefore, professional agencies such as Trade Fair Authority of India recognising the vital economic potential of leather industry have taken up the organising responsibilities of the India International Leather Fair (IILF) at Madras as an annual feature during the week January, 31 to February, 6. The professionalism required for the organisation of IILF has made it essential to house the Fair at venues other than CLRI Campus since 1986. Therefore, to enable the tanners to participate in the technical deliberations which under the present context need to be diversified from the commercial transactions occurring at the time of Leather Fair, CLRI has been organising TGT ahead of India International Leather Fair.

TGT is being organised for the last two years during January 28-30. The technical discussions during TGT have assumed high tempo and more modern methods such as poster sessions and panel discussions have been introduced since 1986. The subjects chosen for discussions include both scientific and technological aspects which have both immediate and far reaching future implications. For example, in 1986 TGT 'Advance in Collagen Science and Function' as well as 'Recent Trends in Leather Finishing' were discussed. In 1987, 'Trends in both scientific aspects of Minering Tanning' and 'Raw Materials Resource Potential' were discussed, each subject being discussed in a day long scientific activity.

TGT: With enlarged cooperation by COSTED

Since 1987, TGT has started receiving cosponsorship from Inter-

national organisations, such as Committee on Science & Technology in Developing Countries (COSTED). It is now recognised that the TGT conceived earlier by Dr. Y. Nayudamma needs a broader base encompassing also the tanning community in developing nations. The cooperation needs to attain a multinational character with changing emphasis in the international trade. Raw material resource for the international leather remaining inelastic and the bulk of the market for leather and products remaining in United States and West Germany, for technological and industrial cooperation among all the opening nations has become evident. The 22nd TGT organised during 1987 brought together representatives of six nations. A panel discussion on South-South Cooperation formed a part of international collaboration. The wisdom of Dr. G. Thyagarajan, then Director of CLRI and Prof. S. Radhakrishna, Scientific Secretary, COSTED has made not only the panel discussion, the formation of International Network for Leather and As Products (INLAP), possible especially in a year in which it had been dedicated to the memory of founder father Dr. Nayudamma. It is heartening that the interaction between COSTED and CLRI has become stronger and the TGT 1988 also is being jointly organised by the two organisations taking very active roles.

Current Emphasis in TGT

The Indian leather industry has now reached a stage of maturity and is much prepared to launch on major initiative like modernisation, diversification and expansion. The international leather industry has become competitive and every step to assure quality leather through innovative technology to reduce and optimise quantity of materials and energy used to adopt cleaner leather processing technologies to absorb modern developments in leather product design and fabrication and to establish adequate effluent treatment systems has to be necessarily taken. In other words, modernisation of Indian Leather Industry is really the need of the hour. Although there used to be large gaps between technology prevalent and those practised in the Leather industry during the present technology absorption rates in the Indian Leather industry are such that gaps between available and the practised technologies are smaller. They are new R & D initiatives to prepare the leather industry for the challenges of the 21st Century have become necessary. It is not by coincidence that the topic for discussion at 23rd TGT is the 'Modernisation of Leather Industry'. Program for TGT-1988 is outlined on page XVI.

In the early phases of TGT, namely in 1965 issues with immediate and short term priorities are discussed in greater detail. The recent TGT's aim at a technological preparedness of the industry for meeting the challenges of the future. The true international character has nevertheless remained and if anything, it has undergone further strengthening. The Indian leather industry has come a long way and TGT has progressively matured.

Concluding Remarks

The opportunities of Indian leather industry have increased although technological challenges have also simultaneously multiplied. The society has become highly complex and even a small effort has become one of cooperative endeavour. Tanners are not only a small community in an ocean of industrialists. There is even a greater need to strengthen all the linkages and draw from every possible cooperation among tanners, scientists and technologists as well as planners. This is the very objective of TGT. There could there be even little doubt as to how important TGT has been since its inception.

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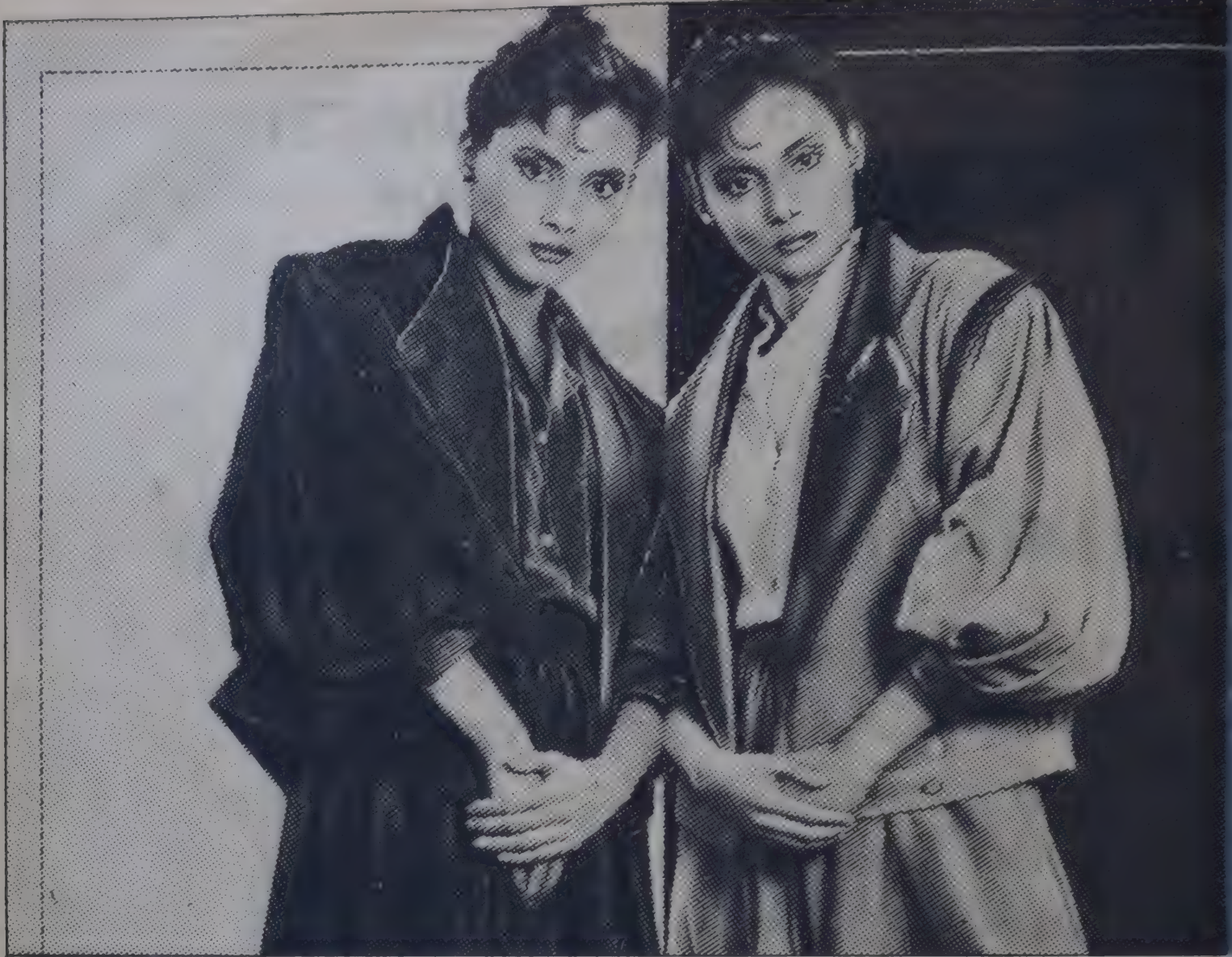
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THE SOFTENING OF LEATHER

A systematic account of the preconditions for consistent quality

Dr. J.C. CROWTHER

(Continued from the previous supplement on 22nd December 1988 issue)

Fixation of the oil by the leather

To avoid the migration of oils during the drying process on storage causing stains, poor finish, adhesion problems, etc., it is necessary that they achieve a fixation with the leather. Fatliquor oils are fixed by the weak, short molecular forces through the dipoles present in the oil molecule. In the case of triglycerides this means ester groupings. The chlorinated and sulfochlorinated oils also show substantivity.

Straight mineral and paraffin oils, however, possess little affinity for the leather. They are easily dispersed in the leather but equally easily migrate out again. In excessive amounts they cause raggy bellies and grain. Surface stains and finish adhesion problems result from their tendency to migrate.

In small amounts they may act as a solubilizing agent for natural or synthetic fats and assist in promoting uniform penetration and distribution. The same property helps to prevent fatty spew. It should be noted that the fixation of oils by leather is by weak molecular forces. No true chemical fixation does not occur and, for the most part, they may be extracted by specific solvents after prolonged storage.

Consistency

Consistency is a property of lipids logically associated with molecular structure and melting point. Low viscosity generally helps flow out over the fiber surfaces, even at reduced temperatures. High viscosity, even pasty fats, can be successfully applied provided fatliquoring is done at high temperature. Excessive stuffing with such fats results in a characteristic feel when the leather cools as the fats revert to their buttery consistency.

Low viscosity natural oils with a high degree of unsaturation are implied. These may be utilized in "blown" and "blended" fatliquors, but for the "tailored" products they represent a danger for the reasons stated. In such cases synthetic fats are used. High melting-point fats may be

included in fatliquor formulations provided the fatliquoring is carried out above 125°F. Tallow and woolgrease perform well in maintaining fiber separation and benefiting surface feel.

Softening properties

Although the mineral and paraffin oils have the highest softening action, they are rarely used alone -- due to their inherent disadvantage of migration. Animal and fish oils have better softening properties than vegetable oils. As a result of the advantages and disadvantages mentioned earlier, fatliquor formulations are usually comprised of several raw materials to produce the required properties of handle, emulsion behaviour, substantivity to the leather, etc.

Ratio of emulsifier to fat

The proportion of emulsifier to fat has a logical consequence on the stability of the emulsion. If there is insufficient "go-between" substance between the oil and water phases, creaming and separation will result. According to the oil and depending on the specific emulsifier, there is a critical proportion below which it is not possible to go. Above this critical level, the fatliquor gains additional stability and may even assume the power to emulsify other raw oils or influence the levelness of dyeings.

As a general rule, the emulsifier should be kept to a minimum to prevent undesirable side effects; absorbency and grain swelling during aqueous finishing or accidental wetting during use (rain), and loose grain can be a further consequence.

The consequences of the chemistry on practical application of fatliquors

It is hoped that the foregoing detailed discussion allows the factors involved in the rational manipulation of fatliquors in actual use to be more easily understood. We have to consider the chemical circumstances:

- the preparation of clean, well separated collagen fibers
- uniformly distributed tannins and retans
- physical chemistry of emulsifiers
- the properties of lubricating oils
- the ratio of fat to emulsifier.

We should now look at the behaviour of the emulsion with regard to influences in the fatliquoring drum:

- careful preparation of the emulsion
- temperature
- electrolytes and the quality of the water
- mechanical energy transfer: drum revolutions per minute drum loading -- the mass of leather and float.

Preparation of emulsion

Fatliquor combinations should be homogenized by stirring the components together before dilution. Careless addition of water when diluting the fatliquor (before addition to the drum) results in a coarse emulsion which can result in irregular surface deposition of the fat. The correct procedure is addition of the hot water during constant stirring, ensuring that the emulsion is uniformly mixed (homogeneous) before addition of further water.

Differences of appearance provide indications of the fineness of particle size; oils in semicolloidal emulsion (almost in solution) down to 0.05 μ and below are opalescent almost transparent dispersions. Above 0.05 μ up to 0.3 μ they are opalescent to cloudy dispersions and from 0.3 μ up to 5.0 μ definitely milky dispersions, i.e. the more milky the appearance, the coarser the particle size. The particle size influences the ability of the emulsion to penetrate and disperse within the fine structure of the fiber. Consistency of results demands that the fatliquor is always correctly emulsified before addition to the drum.

Temperature effects on emulsion behaviour

As viewed under a microscope, a 10% emulsion enlarged 300x to 800x shows a fine dispersion of oil particles, known as micelles, moving with random so-called Brownian motion. Frequent collisions occur and occasionally two micelles coalesce to form a bigger particle. As the temperature is increased, the greater energy in the system is reflected in greater, more vigorous Brownian movement and a greater frequency of collisions occur. The more often particles coalesce, the more quickly will the emulsion start to separate.

High temperature fatliquoring is therefore used to

induce that controlled degree of instability system, which will induce a deposition of fat leather fiber. A further important impact of temperature is to reduce the viscosity of any high melting components of the lipid mix such as waxes, etc. If temperature falls, these will tend to become pasty and deposit on the grain surface causing a greasy surface.

Consistent results and batch-to-batch uniformity demand that exact temperatures are known and controlled in the drum. Unfortunately, even when temperature controls are fitted, it is still possible for the operator to shift to find that the boiler is not delivering the required temperature.

Electrolytes and their influence on emulsion behavior

In discussing emulsifiers, we considered the influence of the dissociation of the polar group on the affinity for the water phase. In the case of an anionic emulsifier, sodium dodecylbenzene sulfonate for example, the sulfonate group is dissociated and there are sodium ions in solution. If, however, the solution is to be saturated with common salt, the excess sodium ions would force the equilibrium towards the undissociated form. Chemically, this is governed by the Law of Mass Action. As a result of now being undissociated, the emulsifier's polar group no longer has affinity for water and can no longer support an emulsion.

An analogous situation exists in the case of cationic emulsifiers and amphoteric emulsifiers. Even these can become unstable in the presence of high salt concentrations -- although they withstand acids and alkalis. It was seen that the solution to this problem is the use of multicharge combinations using both low charged anionic and low charged cationic emulsifiers to form an amphoteric micelle. This is highly resistant to electrolytes. As water brings with it electrolytes in the form of calcium and magnesium salts -- sometimes even iron salts, it is essential that the quality of water be controlled. As discussed earlier, when we considered tanning and retanning, uniform and consistent washing of leather of salts of neutralization must be carried out if the desired results are to be achieved.

Mechanical energy transfer

It has been seen that agitation of the micellar emulsion, whether by thermal energy transfer or by mechanical (e.g. in the rotating drum), results in the breaking of micelles. The extent to which this happens depends upon the drum speed, the drum loading and the drum design. As the impact of the micelle size has been discussed

importance of keeping these three factors constant appreciated. This entails accurate weighing of batch weights and the added inconvenience of constant and complete draining. However our over-objective of consistent quality makes it necessary to control all, even minor variables. Errors when they seldom cancel each other out: it must be a variation -- Murphy's Law -- Errors are Additive!

It is hoped that so far what has been described enables you to design your own fatliquor system and method according to the final quality of the leather. We will now take two examples to illustrate the principles we have described:

Leather with temper or spring

This requirement implies that a center zone within the leather should be less well lubricated and may even have the fibers set stiffly without any lubrication. You will immediately recognise this as a case for achieving zones of differential IEP: high IEP within the central zone and low IEP in the outer zone. This is achieved by controlled distribution of the retanning agents (in turn by controlled extent of neutralization). The differential pH throughout the structure also assists in achieving this effect.

When an anionic emulsion of high charge is introduced into the system, you will appreciate that it penetrates the outer higher pH low IEP zone and is repelled as the acidity from the central zone equilibrates outwards. In such a case, the emulsion breaks and deposits the fat in the outer layers before penetration through to the central zone can occur. The effect is compounded with high temperature, longfloat, but low drum speed and fast drum speeds. The quantity of pure fat absorbed is logically fairly low.

Leather with mellow, soft handle

This is the opposite case. Each fiber must be relaxed, separated and separated after drying, with a coat of lubrication on each fiber to allow unrestricted movement. The sensation of bulk or fullness of handle is maintained and the leather is soft to the touch.

Although more lubricating oil is used than in the previous case, softness is not merely a question of increasing the pure fat offered -- our detailed preparatory emulsion shows how softness will not result if the fat is distributed in the wrong place; insufficiently deeply into the fine structure of the fibers. In fact, this shows how futile it is to compare fatliquors purely on the basis

of percentage dry substance or percentage fat content.

The thorough and uniform penetration of fat, as you can anticipate, is possible provided the cross-section of the leather has uniform IEP. This means that any retanning and other pretreatments should be uniformly penetrated throughout the structure. Anionic fatliquors will penetrate easily through a leather with low IEP: at a pH higher than the IEP the leather is substantially anionic -- exhaustion being completed and fixation taking place with the addition of acid so that a low pH is achieved below the IEP.

Cationic fatliquors are the opposite: easy penetration takes place when the leather is substantially cationic -- having a high IEP its pH is adjusted well below its IEP so that all anionic groups are undissociated. Exhaustion takes place by causing the anionic groups to dissociate: adjusting the pH above the IEP.

The described cases represent the theoretical ideal. In practice in many cases where anionic fatliquors are used, neutralization to achieve penetration means the use of sodium bicarbonate to reach pH values of 5.5 to 6.0. Here, there is a risk of provoking loose grain. Furthermore, in practice, it is difficult to guarantee uniformity of IEP throughout the cross-section.

For these reasons; a practical solution is to carry out a milder neutralization and to base the fatliquor emulsion upon a multicharge combination. If the leather is uniformly neutralized to pH 4.3 to pH 4.5 soft and tight leather can be achieved with the correct fat distribution.

If soft leathers are produced without regard for the physico chemistry we have been discussing, we risk the following: higher fatliquor consumption, heavier leather, greasy grain or suede nap and associated finishing problems.

The significance of cationic fatliquors

With this family of products, one finds as wide a range of properties as found among the anionics:

- high cationic (+200), high dispersing, low softening; a dyeing oil for cationic dyes
- high cationic (+200), low dispersing, high softening; for full-chrome gloving (crusted)
- low cationic (+40), low dispersing, high softening; for multicharge combinations
- low cationic (+40), medium dispersing, surface waxy feel for topping as barrier for drying paste and as handle modifier.

The application of a cationic component to achieve at least part of the desired fiber lubrication means that the anionic components can be proportionately reduced. Thus the IEP is maintained at a higher pH and the leather retains better affinity for the usual anionic dyes. As colour is a major factor in the saleability and value of leather, it is logical that dyeability should always receive consideration.

Fortunately the application of cationic fatliquors does not present any inconvenience: to the contrary, penetration, exhaustion and fixation conditions are parallel to those of the usual mineral tannins. Provided the products have sufficient electrolyte stability, they may be applied along with chrome, zirconium or aluminium tannins.

A final point on the importance of multicharge fatliquors: leather in application should be resistant to liquid water whilst water vapour transpiration should continue. We have discussed the affinity that emulsifiers have for the leather and explained that excessive absorption by the leather results in the leather gaining hydrophilic properties. The residual surfactants remaining in the leather from a multicharge combination are known to interact on ageing. Thus hydrophobic properties develop slowly and the wearability improves.

The importance of sufficient time for horsing-up after fatliquoring

It has already been mentioned that the lipids chosen have polar groups and the molecules of fat display -- or should display -- some affinity towards the collagen protein fiber. This attraction is usually relatively weak compared with a tannin or a dyestuff, and needs time for the molecular accommodation to take place. Premature drying will induce fat migration, especially in the case of vacuum drying. However, by far the greatest loss is by the squeezing, samming and setting out which precedes drying. As a result, a firmer flatter leather results: again, the blame is often placed on the retanning and fatliquoring processes. In general, whatever system of fatliquors is used, the unwelcome fact for the productivity-minded supervisor is that a 24-hour horsing up period is needed.

The impact of drying conditions upon softness

After horsing the leather, striking or setting out and drying, the leather is not soft -- despite all our efforts at fatliquoring! Drying has temporarily stiffened the fibers causing them to stick together. The leather will not be soft until they have been shaken loose and separated again in staking. In preparation for this operation and

perhaps dry milling or drumming, it has to be con with moisture. The importance of these physical conditions is considerable; they frequently cause sions to be wrongly drawn about the efficacy retannage or fatliquoring.

Drying

The method of drying leather has a direct impact on leather softness. As any shoeman knows, and even a hairdresser, the effect of simultaneous moisture and heat on protein fibers is to cause thermal setting and stiffness. As productivity has assumed even greater economic importance, we have forced our tanneries to make constant efforts to speed up every operation. The result has been the use of temperature up to 203°F and application of hot air and vacuum to reduce the drying time from a couple of days in cold air to a couple of hours or even a matter of minutes when heat is applied.

Compensation for the hardness induced by drying is possible during fatliquoring -- but the limitation of increasing fatliquor quantities should be borne in mind. Some compromise in the form of gentler drying conditions is often benefited.

The impact of conditioning

The dry fibers of the leather have not only greater stiffness, but are also stuck together by weak adhesive forces brought about by the presence of the retans, water solubles, etc. Movement of the fibers next to the other, which implies softness, involves the breakdown of these weak adhesive forces. If this is carefully carried out the staking action can tear and break the leather fibers instead of achieving a proper separation fiber from fiber.

Conditioning allows moisture to enter the fiber bundles and to hydrate the individual fibers which become flexible. The retans, etc., responsible for sticking the fibers together also become softened. At a moisture content of 22-27% the fiber weave can be loosened without damaging it. However, attention must be paid to allowing sufficient time for the requisite amount of moisture to come to equilibrium within the fiber weave and to enter each individual fiber.

Again, pressure of production schedules does not favour this apparent waiting period. Defects evident in the staked leather are often blamed on the retanning and fatliquoring, incurring unnecessary corrective trials when the real problem lies in conditioning.

(Contd. on p 10)

LEATHER ABSTRACTS

PRACTICAL EVALUATION OF FUNGICIDES, a Bugby, *J. Shoe Leather Tech. Chem.*, **71**, 138,

The trade in wet blue is now world wide, there is increasing demand for fungicides to prevent mould for at least four to six months. The British Leather Association has developed a stringent test method evaluating the biocidal activity of fungicides, which has been approved by National Testing Laboratory Accreditation Scheme. By using these techniques it is possible to offer the tanner a practical alternative to lengthy incubation-type tests for quality control.

STUDIES ON THE EFFECT OF POLYURETHANE FINISHES ON PHYSICO-MECHANICAL PROPERTIES OF LEATHER, Rashesh Kumar and G.N. Mathur, *J. Leather Tech. Chem.*, **71**, (4), 1987.

This paper gives an account on the preparation of a component polyurethane coating based on castor oil. Its application for finishing leathers. Various properties like tensile strength, percentage elongation, abrasion resistance, water penetration, water vapour permeability, dry and wet rub fastness, scuff resistance, flexibility, water absorption and chemical resistance were determined to evaluate the finish characteristics of the treated leather. Optical and scanning electron microscopy studies were undertaken to investigate the compatibility of polyurethane coating with leather.

HIDE FREE UNHAIRING OF HIDES, L. Muller, *Das Leder*, **38**, 135, 1987.

This paper describes the loosening of the hair of cattle hides with the aid of warm water treatment at 58°C for 24 hours. Then the hides are dehaired along with the machine by machine. This method can, however, be applied only in the fresh hides.

HIDE FREE UNHAIRING AND OPENING UP OF HIDES, S. F. Elsinger, K.H. Munz, R. Babinek and V. Olip, *Das Leder*, **38**, 143, 1987.

In this paper, a sulphide free method of depilation and opening up of hides is presented.

A REVIEW OF THE USES OF ENZYMES IN THE TANNERY, M.M. Taylor, D.G. Bailey and S.H. Fairheller, *J. Am. Leather Chem. Assn.*, **82**, 153, 1987.

Proteolytic enzymes catalyse the hydrolysis of variety of proteins. Recently, carbohydrases and lipases have been proposed for the processing of hides and skins. This review will summarise the research covering the period from 1965 to 1986 and is intended to provide some insight on the potential uses for enzymes in the tannery.

INNOVATIVE TANNAGES FOR IMPROVED LEATHER, S.D. Gupta, *J. Am. Leather Chem. Assoc.*, **82**, 167, 1987.

In this paper, an attempt has been made to put forward some of the recent innovations in leather science like oxzolidine, chrome-aluminium-polycarboxylic acid for practically chrome free tannages and various applications of fatliquors for improved leather.

THE CHARACTERISATION OF ACRYLIC SYNTANS FOR RETANNING CHROME LEATHER. Part-II: EFFECT OF COMBINING SYNTANS, C.J. Ward, *J. Am. Leather Chem. Assoc.*, **82**, 185, 1987.

The rapidly growing class of syntans based on acrylic chemistry is suitable for the production of all leather types, in particular the softer, lower density full grain leathers so much in demand today. A previous paper devoted to the characterisation of polymeric acrylic syntans essentially dealt with such products as single items for tanning and retanning. This paper explores, in more detail, the behaviour of each type of syntan and an attempt has been made to quantify the effects of utilising a combination of products in a retanning context.

THE INFLUENCE OF CROSSLINKING AGENTS OF RESIN SYSTEM, H. Traubel, L. Tork, B.Zom and Wenzel, *Das Leder*, **38**, (9) 177, 1987.

The temperature related behaviour, tensile strength and elongation at break of films produced from acrylate, butadiene and polyurethane based resins was investigated with regard to hardeners of the polymers. The influence of various cross linking agents on the properties

of films before and after soaking in water was studied using films produced from selected products from these three polymer groups. From these results, it was possible to draw practical conclusions on how to improve the finishing of leather with aqueous finish systems.

NEW PRODUCTION METHOD OF HYDROPHOBING OF LEATHER WITH HIGHEST REQUIREMENTS, M. Kanbar and H. Kilian, *Das Leder*, **38**, (9) 192, 1987.

This paper describes a hydrophobing systems under easy production conditions. Dyestuff groups, chrome content in the leather and non-ionic surfactants influence the result. Well proven processes are introduced.

CROSS-LINKED POLYMERS TO PROVIDE BETTER PROPERTIES IN LEATHER FINISHING, I. Bouchard and M. Greif, *J. Am. Leather Chem. Assoc.*, **82**, 323, 1987.

The physical properties of a polymer system are dependent upon the molecular weight of the polymer. In the coatings industry, reactive systems are employed to provide cross-linking to achieve the performance level being sought. In leather finishing, the times and temperatures are generally insufficient to obtain significant cross-linking without having pot life problems.

In this paper, the entire subject has been reviewed and existing approaches with novel compositions are discussed.

A COMPARATIVE MORPHOLOGY OF KANGAROO & BOVINE LEATHER, J.H. Bavinton, D.E. Peters and L.J. Stephens, *J. Am. Leather Chem. Assoc.*, **82**, 1987.

Histological comparison of the fibre morphology of kangaroo and bovine skin has allowed the differences between their physical properties to be explained in terms of angle of weave and fibre size distribution. The tensile strength exhibited by light weight leathers made from kangaroo skins is significantly higher than bovine leathers and appears to be due to the fibre morphology of the skin.

SOLVENT PRESERVATION OF PIG SKINS, P.R. Buechler, J.S. Fisher, M.P. Dahmsand, M.V. Hannigan, *J. Am. Leather Chem. Assoc.*, **82**, 201, 1987.

This paper describes two processes for dehydrating pig skins that could be converted into desirable leather

products. Dehydration of bated pig skins preserved skin with an indefinite storage life. Product is one-sixth the weight of the fresh, wet pig skin thus minimising freight costs. The dehydrated product can be graded, earning more money for the producer, while saving money for the leather manufacturer. It can be made into crust leather with a better appearance and better physical properties than conventionally processed pig skin.

APPLICABILITY OF FLUORO-CHEMICAL COMPOUNDS WITH CARBOXYLIC GROUPS IN LEATHER WATER PROOFING PROCESS, E. Gratacos, and M. Fort, *J. Am. Leather Chem. Assoc.*, **82**, 1987.

In this paper, the possible compatibility of a fluorine compound in leather waterproofing process with non-fluorinated mono carboxylic acids is studied. This is a chromium complex of a fluoro chemical compound which can be used as a fixing agent for mono carboxylic acids in place of conventional chromium compounds. Further, the use of another fluorocarbon compound in place of the conventional mono carboxylic acids is studied as a result of the carboxylic groups in its composition. The results of the above mentioned water proofing process are studied.

COMPUTER COLOUR MATCHING FOR GARMENTS MADE OF LEATHER, T. Shirai, K. Utsugi, K. Vehara and H. Okamura, *Hikabun*, **33** (2), 69, 1987.

This paper describes the application of a computer for colour match prediction by means of a computer for the dyeing process. Experimental dyeings were carried out for chrome-tanned pig skin suedes. Spectral reflectance of them was measured from 380-750 nm. To calculate the tristimulus values X, Y, Z. Computer programs were written in BASIC and run on a micro computer.

Spectral reflectance of suede side was considerably affected by the direction of the nap; the number of repeated nap-brushing and sampling location on the leather. Therefore, it should be noted to take samples from a definite location, to brush nap in the same direction with minimum numbers of repeated nap-brushing and to measure the spectral reflectance for several numbers of specimens.

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NEW PRODUCTS

COMPUTER COBBLER

An automatic upper roughing called 'Computer Cobbler' has been developed by The Bush Co. Ltd., Belgrade. This is used for preparing shoe bottoms for attaching to soles at a potential speed of 220 units an hour. Processing information for upto 196 different models of shoes and boots are memorised by the computer. When one shoe is just programmed, the machine adjusts itself automatically for making bigger or smaller sizes and it further distinguishes the right from the left.

-- *Foto Shoe*, 15, 13, (2), 1987.

SHOE RECOLOURANT

A two-step shoe colouring product for leather, synthetic and fabric shoes, DASCO Recolour has been introduced by Dinbeman & Sons. Initially Recolour is available in 12 colours and consists of four items -- a preparer liquid, the Recolour liquid, a scouring pad and an applicator brush. First step is to clean and brochure the shoes using the preparer liquid and scouring pad. This removes any dirt and polish, which is necessary for the Recolour to adhere well. The second step is the colouring process using the brush. The shoes require two coats and should be left to dry for 24 hours before wearing. The products costs around Sterling Pound 1.89.

-- *Dasco News*, (8), 1987.

SELF-SHINING LIQUID POLISH FROM KIWI

Elite Self-Shining Shoe Polish from Kiwi is said to be only shoe polish that goes on like a liquid yet shines and nourishes like a paste. It contains natural waxes, is water resistant and can be rebuffed when dull. Other claimed benefits include resistance to cracking and peeling and the fastest drying time of any liquid polish. It is available in light colours (flesh, brown, grey, white, neutral, burgandy, tan and blue).

-- *Canadian Footwear Journal*, June/July, 1987.

THE STRIDER 500

The Strider 500, a fitness walking shoe designed by Donner Mountain, features the company's Cantilever

Comfort System. The shoe is designed for the active walker but is also suited for stylish daily wear. The Cantilever outsole absorbs shock and cushions the foot with each step. The outsole cave and flares outward on contact absorbing shock and reducing fatigue.

-- *Canadian Footwear Journal*, June/July

NEW POLYURETHANES FOR FOOTWEAR

A new family of polyurethane systems for footwear Voralast was presented for the first time by Dörmagel at Simac. Voralast PU Systems are used in a range of applications from fashion and summer wear to summer sandals and beach shoes and for ski boots. Their features include outstanding resistance to wear, flexing, slipping and to chemical

-- *Foto Shoe*, 15, 13, (

FINE SHINE

The Quick shine is an instant, no half shoe shine which comes in a compact, silver tuned case. It gives more than 100 shines and can be used on any shoe. \$10 is supported retail price.

-- *Travel Ware*, 180, (11)

MACHINE TO AID DESIGN OF FOOTWEAR

An electro-hydraulic testing machine from Instron has been put to use by Leeds University's Department of Pure and Applied Biology as part of a pioneering study into the elastic properties of animal feet and tendons. The results of the tests could prove to be of considerable interest to British Shoe-makers. A separate study also examines the behaviour of human feet during contact with the ground and the pressures exerted on animal paw pads. In order to preserve tendons during experiments, liquid carbon dioxide is passed through the hollow clamps of the Instron 8000. The researchers have aroused considerable interest among leading shoe manufacturers and could give valuable information in the design of footwear.

-- *Shoe and Leather News*, 372

LEATHER NEWS FROM ABROAD

KOREAN FOOTWEAR

Korea exports a lot of their light sports shoes to America and supplies the hides. Last year South Korea became a major customer for U.S. hides purchasing worth more than \$10 million. The United States, the world's biggest manufacturing company has become more a supplier of raw materials. It purchased 116.7 million pairs of shoes from Korea compared to 47.5 million in 1983. (*Korean News*, Sep.

TOXICITY DANGER

Occupational Health should be as important to managers and employees as safety but is frequently not recognized as a problem of any immediacy. The report published by the Health and Safety Executive shows that between 1985 and 1986 there were 77 major accidents in footwear and clothing industries and three fatal and 217 major accidents in the footwear industry including the manufacture of leather and leather goods. (*Shoe & Leather News*, (3724) 1987).

DEER FARMING

Deer farming enterprise has been established at Clautains, Wiltshire and it is one of the largest farmed herds of deer in the UK, including a small number of Fallow deer together with Red Deer which form the bulk of the herd. (*JSLTC*,

THE SLIPPER FAIR

The 30th International Slipper and Footwear Fair is to be held in Blackpool from January 17-19, 1988. A Pound 2.6 million development programme will revamp and upgrade all facilities at the Slipper Fair, Britain's oldest footwear exhibition, and its 30th Birthday will provide a preview of boots, shoes and shoes for the autumn/winter 1988/89 season. (*Shoe & Leather News* (3726), 1987.)

INTERNATIONAL SHOE CARE ASSOCIATION

The International Shoe Care Association has been set up by eleven major shoe polish companies at a conference organized by the Japanese instigators in a Hongkong Hotel. There were discussions on future development of shoe care products, international cooperation between international companies, licensing and importing agreements and mutual technical cooperation in improving productivity and reducing costs. Delegates from Singapore, U.K., Belgium, Spain, West Germany, USA and Korea participated in the above conference. (*Shoe & Leather News*, 3726, 1987).

KANGAROO SKINS

Kangaroo skins are used in the manufacture of shoes, leather goods and hand bags. Animal Welfare groups indicate that more than 3.5 million Kangaroos are killed every year of which one million are slaughtered illegally by poachers. (*Shoe & Leather News*, 3726, 1987).

BANGLADESH BARTER AGREEMENT

Trading Corporation of Bangladesh has signed an agreement with the Japanese firm Mitsubishi for an exchange of goods worth US\$ 10 million which includes the export of leather and hides valued at about \$2 million. In return the Japanese company will supply unassembled buses and trucks, soda ash, caustic soda and BP sheets. (*Leather in Asia*, 2 (2), 1987).

TARIFF CUTS ON FOOTWEAR

Taiwan is planning sweeping tariff cuts averaging 50% on 3500 major imports which will result in increased sales opportunities for foreign suppliers. Under the proposals, duties on footwear will be cut from 15 to 5% and apparel and textiles from 30 to 12.5%. (*Shoe & Leather News*, 3727, 1987).

POUND 21,000 DAMAGES FOR BROKEN HEEL INJURIES

The twisted heel of a shoe was the beginning of a four year court battle which on November 3, resulted in a Sterling Pound 21,000 award for a Nottinghamshire woman. Mrs. Joge Youd (39) said that she had not been able to work since the accident in June 1983 when she had suffered back injuries after the heel of her shoe had twisted and she had fallen down a flight of steps. (*Shoe & Leather News*, 3728, 1987).

TAIWAN & KOREA TOP US IMPORTS

Taiwan and Korea set a blistering pace in capturing bigger slices of the U.S. non-rubber footwear market last year accounting for 46% and 19% respectively, of all U.S. shoe imports. According to the Non-Rubber Footwear Quantity Statistical report Taiwan sent 436 million pairs of non-rubber footwear to the US in 1986, an increase of 17.3% from 1985. Korea followed with 182 million pairs, up 33%; France, Italy and Spain recorded a decrease of 25.7%, 13.1% and 14.2% respectively. Big gainers were Thailand, Yugoslavia, Portugal and Macao.

ORTHOPAEDIC SHOES BY CAD/CAM

Researchers at North Carolina State University are exploring the feasibility of computer-aided-design and manufacturing (CAD/CAM) in making custom orthopaedic shoes more

quickly and at lower cost. The University team has developed a prototype CAD/CAM system for producing shoe casts shaped like the German Foot. The system takes numerical foot measurements and translates them into instructions for a machine that produces the cast using commercial measure-

ments of foot generated by the CAT scan. The system displays a wire frame model on the screen on a computer terminal. Shape modifications can be made at the computer to accommodate special needs and measurements of a patient's foot. (*Footwear News*, 33, (44), 1987).

(Continued from p. X)

A tannery producing 3000 full hides daily for shoe upper leather conditions by water-spray, piles 24 hours and then "relaxes" the leather, hanging each side for 2 days in a conditioning room maintained at 85% humidity and 82°F. This is considered an essential part of the softening process giving the full handle and uniform break-up of the grain needed for their quality moccasin shoe upper. A final comment on conditioning. Under-conditioning, we saw results in torn fibers, raggy bellies and loose grain. Overconditioning allows too easy softening in the staking operation -- too easy, because the moisture dries out again, the fibers again adhere to each other and leather becomes hard.

Conclusions

There are nine factors needing control to make soft leather:

- correct preparation of well separated fibres
- careful preparation of fatliquor emulsions
- correct selection of lubricating oils
- exact manipulation of emulsion chemistry
- control of fatliquor penetration and deposition
- as gentle drying as productivity permits
- suitable conditioning and relaxing
- adequate staking and/or dry milling.

The soft crust is now ready for the finishing operation. In finishing, the application of resins which penetrate the grain often has a hardening effect. The crust therefore must be prepared a little softer than the requirement for the finished leather. It is also the responsibility of the finishing department to use their skill and experience to minimize the hardening effect during relaxing.

PROGRAMME FOR TGT-1988

28th January 1988 :: SESSION - I :: Chairman: Dr. A.K. CHATTERJEE

Papers:

RAW HIDES AND SKINS : PROBLEMS/POSSIBILITIES -- Mr. W. Carey, U.K.

MODERN PRESERVATION METHODS -- Dr. H. Keller, U.S.A.

CURING AND HANDLING OF HIDES AND SKINS -- Dr. (Ms). C. Money, Australia.

METHODS OF CURING, GRADING, HANDLING AND TRANSPORTATION OF HIDES AND SKINS -- Dr. R. Bhaskara

29th January 1988 :: SESSION - II :: Chairman: M.M. HASIM (India)

NAYUDAMMA SCIENCE FOUNDATION LECTURE:

CHEMICAL INDUSTRY AND SOCIETY -- Prof. M.M. Sharma, India.

NEWER PROCESS TECHNOLOGIES -- Dr. W. Pauckner, FRG

RECYCLING OF FLOATS AND TEMPERATURE CONTROL -- Dr. M. Tommaselli, Italy

RECENT ADVANCES IN DRYING -- Mr. J. Spahrman, FRG

PROCESS CONTROL IN TANNERIES -- Mr. P. Latscha, Switzerland.

30th January 1988 :: SESSION - III

B.M. DAS MEMORIAL LECTURE -- Dr. A.D. Bailey, U.K.

R & D INITIATIVES AT C.L.R.I.

21ST CENTURY CHALLENGES TO LEATHER INDUSTRY

PANEL DISCUSSION

FAIRS IN ASIA (IN 1988)

name of the Fair	Date	Venue	For further information: contact-
India International Leather Fair	Jan. 31-Feb. 6	Rajaji Hall, Madras-2.	The General Manager, Trade Fair Authority of India, Pragati Maidan, New Delhi 110 001. Phone: 3318374.
Pakistan Leather Show	Feb. 5-7	Holiday Inn, Karachi	Pakistan Tanners Association, Plot No. ST-7, Sector 2-A, Korangi Indl. Area, Karachi.
Tokyo Leather Fair	March 15-16	Tokyo, Japan	Tokyo Leather Fair Office, 6-20-6, Asakusa, Taito-Ku, Tokyo 111, Japan.
Taipei International Sporting Goods Show	April 11-15	Taipei World Center, Taiwan	China External Trade Development Council, 201, Tunhwa North Road, Taipei-10591, Taiwan.
Tokyo Shoe Bag '88 Footwear and bag and related machinery and accessories)	April 13-17	Jakarta, Indonesia	Hongkong Expositions Ltd., Suite 1704-1706, Yardly Commercial Bldg., 1-6, Connaught Road (W), Hongkong. Phone: 5-815 2928.
Taipei International Footwear and leather Goods Show	May 3-7	Taipei, Taiwan	China External Trade Development Council, 201, Tunhwa, North Road, Taipei 10591, Taiwan.
Leather 88	May 25-28	Hong Kong	International Leather Exhibition Ltd., 4306, China Resources Building, 26, Harbour Road, Hongkong Phone: 5-736211
World Leather 88	July 4-8	Seoul	SHK International Services Ltd., 22/F, 151, Gloucester Road, Hongkong Phone: 5-8326106
Tokyo Leather Fair	Sep. 21-22	Tokyo, Japan	Tokyo Leather Fair Office, 6-20-6, Asakusa, Taito-ku, Tokyo 111, Japan.
International Footwear Fair and International Hand Bags and Travel Goods Fair	Oct. 26-29	Hongkong	Headway Trade Fairs Ltd., 9/F, Singho Finance Building, 168, Gloucester Road, Hongkong. Phone: 5-8335121.
China Footwear 88	Nov. 22-27	Shanghai Exhibition Centre, PR China	Shanghai International Trade Information & Exhibition Corporation, 817-832, Dough Da' Min Road, Shanghai, China. Phone: 463810.
Textiletech 88	Nov. 23-29	Beijing, China	SHK International Services Ltd., 22/F, 151, Gloucester Road, Hongkong Phone: 5-8326100.

STATISTICS

SHEEP POPULATION AND THEIR SLAUGHTERINGS OF CERTAIN COUNTRIES

(Figures in 1

Country	1983		1984		1985	
	Population	Slaughterings	Population	Slaughterings	Population	Slaughterings
Australia	133,237	26,426	139,242	26,057	149,747	30,4
New Zealand	70,263	44,257	69,739	45,504	70,600	46,7
South Africa	33,202	8,203(a)	31,265	8,540(a)	30,256	8,2
Argentina	30,000	154(d)				
		6.922(c)	30,000	148(d)	29,000	1
U.K.	22,944	15,068	23,317	14,959	23,946	15,7
Spain	17,464	11,260	17,554	11,352	17,485	11,1
France	12,251		11,231		10,824	
		9,337(b)		9,105(b)		9,0
U.S.A.	1,208		1,042		962	
Italy	12,140	6,619(a)	11,487	6,758(a)	10,443	6,1
	9,257		9,228		9,500	
		7,657(b)		8,048(b)		8,1
Irish Republic	1,059		1,088		1,089	
	2,424		2,537		2,690	
		1,624(b)		1,683(b)		2,0
West Germany	9		9		9	
Canada	1,172	860	1,218	908	1,300	8
Netherlands	809	228(a)	791	233(a)	748	1
	772		766		814	
		458(a/b)		391(a/b)		466
Belgium/Luxemburg	34		34		34	
	87*		101*		105*	
		382(b)		344(b)		3
Denmark	7		6		6	
	52		65		52	
		20(b)		25(b)		
	N.A.		N.A.		N.A.	

* - Unofficial Figures. N.A. - Not Available. (p) - Provisional.

(a) - Slaughterings in abattoirs or inspected slaughter houses. (b) - Including goats

(c) - Total Marketings. (d) - Marketings at Avellandeda only until 5th Sep. 1985, marketing at Liniers only from 6th Sep. 19

Source: (1) F.A.O. Production Year Book - Vol. 39, 1985.

(2) "Hides & Skins" No. 1, 1987, published by Common Wealth Secretariat, Marlborough House, London SW1y 5HX.

KOREAN SHOE EXPORTS BY VOLUME & VALUE (KFSA) (1000 pairs, \$ million)

	Volume	Value
1971	41,538	50.491
1981	231,751	1,049.323
1982	271,171	1,181.759
1983	271,151	1,289.689
1984	271,872	1,398.409
1985	272,763	1,571.227
1986	348,694	2,109.301
1987 (est)		2,200-2,400

KOREAN SHOE EXPORTS BY CATEGORY (1000 Pairs, \$ Million, FOB on Custom Clearance Sale)

Type	1985	1986
	Vol.	Vol.
Rubber Shoes & Boots	14,338	13,704
Canvas Shoes	133,330	148,529
Chemical Shoes	14,235	34,217
Leather Shoes	70,591	100,965
Slippers	21,491	27,420
Total	272,763	348,694

Ester India

India, which proposes to public on February 9 with an issue of 88.19 lakh equity of Rs. 10 each aggregating Rs. 882 crores, will have the distinction of being the first company in India to manufacture colour polyester film. Besides, it will manufacture dope dyed polyester yarn for the first time in the country, according to Mr. N. Singhania, chairman and Indian promoter of the company. The other promoter is Mr. J. J. Throff, a non-resident businessman based in Singapore.

Singhania said that the Rs. 882 crore project at Khatima, Uttarakhand district, a backward area of Uttar Pradesh proposed to manufacture 20,000 tonnes of polyester chips, 4,000 tonnes of colour class high tech polyester film and 1,200 tonnes per annum polyester filament yarn.

The plant for the manufacture of polyester chips had already started commercial production on January 9 while the plant for the manufacture of high tech polyester film was expected to be in commercial production by the end of this month and the plant for the manufacture of polyester filament yarn before February 5.

The proposed public issue was part of the total issue of 88.19 lakh shares. Out of this, 64.31 lakh shares amounting to Rs. 643.1 crores were reserved for preferential allotment to SBI Mutual Fund, Canbank Mutual Fund and Unit Trust of India.

It was the only company in India which had an integrated operation for the manufacture of polyester chips, polyester film and

dope dyed polyester filament yarn in the same complex. Besides, the project had six batch lines and could manufacture six different types of polyester chips simultaneously. Its product range included fibre/filament grade chips (semi dull and full dull, bright, cationic dyeable and dope dyed), pet bottle grade chips, film grade chips and industrial plastics grade chips.

Its polyester film plant, which had been imported from Lindauer Dornier GmbH, West Germany. The polyester film would find use in flexible packaging for food products, cosmetics, gift wrapping, pharmaceuticals etc. The colour-polyester film had been commanding a high premium and had tremendous export potential, especially in the US.

Mr. Singhania said that the company adopted a unique process for the manufacture of dope dyed polyester POY yarn which would considerably enhance its profitability. Dope dyed polyester POY yarn found extensive use in the fabrics industry, particularly in shirting and suiting.

The chairman said that the break-even point was as low as 28 per cent. The company expected to achieve 85 per cent capacity utilisation in the first full year of operations with a turnover of Rs. 120 crores with an operating profit of Rs. 30.50 crores. After interest of Rs. 8.68 crores and depreciation of Rs. 8.86 crores, there would be a net profit of Rs. 13 crores. A full capacity utilisation — 100

per cent — was expected to be achieved in the second year with a turnover of Rs. 142 crores and operating profit of Rs. 37 crores. After interest of Rs. 9 crores and depreciation also of Rs. 9 crores there would be a net profit of Rs. 19 crores. The chances of paying a maiden dividend during the first year's operations were good, he added.

The company would have a total benefit of over Rs. 35 crores over a period of seven years from sales tax incentives. Besides, there was a saving of Rs. 140 lakhs on the fuel front because it would use paddy husk for fuel except in the monsoon season, Mr. Singhania said.

The company proposed to go in for expansion also within the next three years in view of the expected wide gap between demand and supply. Under the expansion, it would step up the capacity of polyester chips to 60,000 tonnes from 20,000 tonnes, polyester films to 14,000 tonnes from 4,000 tonnes and polyester yarn to 15,000 tonnes from 1,200 tonnes.

GUJARAT ALKALIES

Gujarat Alkalies and Chemicals Ltd. proposes to issue new equity shares amounting to Rs. 13.54 crores on rights basis to the existing shareholders, to meet part financing of its new projects and its long-term capital needs.

Out of the total issue, 64.31 lakh equity shares of Rs. 10 each at a premium of Rs. 10 per share are being offered to the existing shareholders on rights basis and 3.38 lakh shares to the employees of the company. The management intends to retain 10 per cent of the issue out of the oversubscription amount.

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MARKET INFORMATION

Chemicals, Dyes Movement Restricted

Due to the continuing of transport in Bombay, the movement of chemicals and dyes markets is severely hit. There has been a coming of essential raw materials from upcountry centres keeping the market practically at standstill. The caustic soda and soda ash re-

mained at previous levels, titanium dioxide eased a bit. MEK's position was very tight at Rs. 40. Due to seasonal demand citric acid moved up to Rs. 42.50, cyclohexanone was placed at Rs. 47, PVA 173 was hiked to Rs. 100 due to supply pressure. Amongst dye intermediates, alfa na-

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and a seller. The prices are published only with a view to giving some ideas of market conditions. The prices are inclusive of Excise and Maharashtra Sales Tax.

phthol and ester were in good demand. 3-3-Di chloro benzene was in short supply at Rs. 170.

(Prices as on 13th January 1988)

INDUSTRIAL CHEMICALS	Per kg.				
Ammonium sulphate	2.00	Boric acid (Tech.)	21.00	Cream of Tartar (Tech)	64.00
Ammonium phosphate (Mono)	14.50	Bisphenol-A	60.00	Citric acid (Belgium)	40.00
Ammonium phosphate (DI)	12.00	Butyl carbitol	35.00	Citric acid (Indian)	42.50
Ammonium carbonate (DI)	17.00	Caustic soda (Flakes)	8.50	Copper sulphate	17.00
Ammonium bicarbonate	4.75	Caustic soda (Solid)	7.75	Chromic acid	50.00
Ammonium chloride	3.50	Caustic soda (Lye)	6.00	Cyanuric chloride	120.00
Ammonium nitrate	4.00	Calcium chloride 70% (solid)	3.25	Cobalt oxide	280.00
Calcium white powder	21.00	Calcium chloride 75-80% (fused)	3.50	Carbitol	52.00
Urea (Resale)	60.00	Calcium chloride 36% (Anhydrous)	5.00	Dicalcium phosphate (Anhydrous)	16.00
Sodium carbonate	6.00	Calcium carbonate (PPT)	3.00	Ferric chloride (Lumps)	6.00
Whiting powder (33% Cl)	3.75	Calcium carbonate (Activated)	3.55	Ethylene urea	56.00
Alk (Granular)	15.00	Camphor (Indian)	80.00	Glue flakes	8.45
Alk (Powder)	15.50	Cresylic acid	50.00	Glue sheets	6.75
				Gohsenol GH17 (Resale)	90.00

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Hyflosupercell	19+ST	Santobrite (Indian)	36.00	Carbon Tetrachloride
Hexamine	29.00	Soda Ash (Tata)	3.90	Cyclohexanone
Industrial Wax	25.00	Soda Ash (Birla)	3.75	Cyclohexanol
Litharge	15.00	Soda Ash (Imp.)	3.50	Diacetone
Lead Acetate (Tech.)	28.00	Sodium bicarbonate	5.25	Diethylene glycol (DEG)
Lithopone	15.00	Sodium bisulphite	4.50	Dioctyl Phthalate
Magnesium chloride (crystal)	2.00	Sodium silicate	3.00	Diallyl Phthalate
Menthol crystal (Flakes)	185+Ex.+ST	Sodium acetate	5.90	Dimethyl Phthalate
Menthol bold	205+Ex.+ST	Sodium alginate	220+ST	Dioctyl Adipate
Menthol crystal bold	245+Ex.+ST	Titanium Dioxide (Anatase)	52+ST	Dibutyl Adipate
Magnesium carbonate (Japan)	16.00	Titanium Dioxide		Dipentene
Magnesium carbonate (Indian)	15.00	(Rutile — RCR ₂)	70+ST	Dimethylamine 40%
Maleic Anhydride (per kg)	38.00	Tartaric acid (Crystal)	94.00	Dimethylamine 60%
Mercury (75 lbs.)	9,000.00	Trisodium phosphate	4.80	Ethyl Acetate
Nickel chloride	60.00	Thiourea	65+ST	Ethyl Acrylate
Oxalic acid	20.00	Urea (Tech)	2.75	Ethylene Dichloride
Peppermint oil (Rectified)	90+Ex.+ST	Vacuum salt	1.00	Ethylene Glycol
Potassium carbonate (Indian)	19.00	Zinc Dust	30.00	Formic Acid (Imp.)
Potassium carbonate (Imported)	21.00	Zinc Oxide	30.00	Formaldehyde
Potassium bichromate	22.00	Zinc chloride powder		Glycerine (CP)
Potassium phosphate (Mono)	14.00	(technical)	14.00	Glycerine (IW)
Potassium phosphate (Di)	14.00	Zinc sulphate	3.90	Hydrogen peroxide 50% (Resale)
Polyvinyl alcohol (No. 117)	88.00			
Polyvinyl alcohol (No. 173)				
(Resale)	100.00			
Polyvinyl alcohol (No. 208)	95.00			
Paraformaldehyde	16.00			
Phthalic anhydride 96%	23.25			
Pentaerythritol (Resale)	53.00			
Paraffin wax	13.50			
Rangolite (German)	70.00			
Rangolite (Czech.)	46.00			
Sodium sulphate (Fine)	4.00			
Sodium sulphate (Coarse)	3.80			
Sodium sulphide 50-52% (Flakes)	8.00			
Sodium sulphide 58-60% (Flakes)	9.00			
Sodium sulphide pure (Flakes)	12.25			
Sodium nitrite	13.25			
Sodium chlorite 80% (Spain)	90.00			

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Acetic Acid (Glacial) (Resale)	13.50
Acetic Anhydride (Resale)	24.00
Acetone (Resale)	19.00
Adipic Acid	50.00
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Aniline Oil	44.00
Benzoate Plasticiser	33.00
Butyl Acetate	42.00
Butyl stearate	36.00
Butyl acrylate	66+ST
Butanol (Resale)	35.00
Benzyl chloride	24.00
Benzo trichloride	16.00
Benzoyl chloride	22.00
Benzyl alcohol (FPC)	36.00
Bromine Liquid	42.50

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Paraformaldehyde 92% (Spain)

Diocetyl Phthalate (D.O.P.)

Di Butyl Phthalate (D.B.P.)

O-Xylene (Distil) ★ Turpentine

Acetone/IPA/MEK/MIBK/IBA (Recovered)

Ethyl Acetate Methyl Acetate (Recovered)

CONTACT MANUFACTURER :

M/s Shree Chem Industries

2/4, Kubal Niwas, Gokhale Road (N), Dadar,

BOMBAY-400 028.

Tel. : 456868

Polyethylene Glycol (No. 1600)	14.00
Polyethylene Glycol (No. 4000)	38.00
Polyethylene Glycol (No. 6000)	50.00
Para Cresol	40.00
Styrene Monomer	32.00
Sorbitol	16.50
Trichloroethylene	25.50
Triethanolamine	50.00
Sulphuric Acid	2.10
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	11.75
Triethylamine	50.00
Vinyl Acetate Monomer	41.00

SOLVENTS	Per Litre
Benzene	8.80
N-Heptane	8.00
N-Hexane	8.75
Methanol	6.75
Solvent Naphtha Heavy	9.50
Solvent Naphtha Light	8.50
Toluene	9.25
Xylene	14.00

DYES INTERMEDIATES PRICES ARE WITHOUT TAX & EXCISE

	Per kg.
Alphanaphthylamine	54.00
Alpha Naphthol (Imp.)	165.00
Aceto Acetic Ester (Methyl)	68.00
Ammonium Molybdate	170.00
Anthraquinone	80.00

Anthranilic Acid	61.00	N-Methyl J. Acid	
2-Amino-4-Nitrophenol (Imp.)	140.00	N-Methyl Aniline	
Blue B. Base (Local)	235.00	Naphthalene crude	
Beta Naphthol (Atul)	55.00	Naphthalene (Refined)	
Benzidine Dihydrochloride (BDH)	70.00	Ortho Anisidine (OA Imp.)	
Bromamine Acid	375.00	Ortho Dichloro Benzene (OBCB)	
BON Acid	107.00	OT Base	
Chicago Acid	280.00	Para Dichloro Benzene (PDCB)	
Coach Acid	53.00	Para Anisidine (PA-Imp.)	
C. Acid (Imp.)	280.00	Para Anisidine (PA-Local)	
Cyanuric Chloride (Japan)	120.00	PNA	
2, 4, DNCB	25.00	Para Cresidine (Imp.)	
Dihydrothio PTOS (Imp.)	500.00	Para Amino Azo Benzene (India)	
Dimethyl Aniline	58.00	PNCB	
Diethyl Aniline	140.00	Para Amino Acetanilide	
Di-amino stilbene disulphonate acid	120.00	1-Phenyl 3-methyl-5 Pyrazolone	
3,3-DCB (Imp.)	170.00	Phenyl J. Acid	
Gamma Acid (Atul)	160.00	Para Amino Benzoic Acid	
H. Acid (Atul)	150.00	PT Base	
G. Salt	56.00	Rhoduline Acid	
Isophthalic Acid	39.00	Resist Salt	
J. Acid	270.00	Resorcinol	
J. Acid Urea	270.00	Sodium-Naphthionate	
K. Acid	95.00	5-Sulpho-Anthranilic Acid	
MDPS (German)	200.00	Sulpho Tobias Acid	
MNA	75.00	Sulphanilic Acid	
Meta Urido Aniline	135.00	Trichloro Benzene (TCB)	
MPD (Local)	130.00	Tobias Acid	
MPD (Japan)	150.00		
Naphthenic Acid	11.00		

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When it comes to chemicals, we add a little extra. Making sure to produce chemicals that meet exacting standards of quality, purity and reliability. Backed by research and thorough testing. Our customer service can help you improve your present products and develop new ones. And remember, we can meet your requirements whenever and wherever you want. Why not try?

We manufacture: N.I.A. • E.D. • Salt • S.M.C.A. • Sodium • Hydrochloric Acid.

We market: Acetic Acid • Anhydride • Butyl & Amyl Acetate • Ethyl & Butyl Acetate Acetate • Paraldehyde • D.B.P. • D.

ashok organic industries

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Phones: 252236-252256 • Telex: 01
Factory: Nandgaon, Dist. Raichur, Karnataka

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MAGNESIUM STEARATE BP 80

ZINC STEARATE

ALUMINIUM STEARATE

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DRIED ALUMINIUM HYDROXIDE IP

MAGNESIUM HYDROXIDE POWDER IP

ZINC CARBONATE

AND OTHER LABORATORY CHEMICALS

Contact Manufacturers & Exporters :

ARUN INDUSTRIES

303-A Vrindavan, Ramachandra Lane, Malad (West), Bombay-400 064.

Phone : Office : 685559/697422 Telex : 011-78081 ARUN IN Gram : "DEVOTION"

WE ARE REGISTERED WITH D.G.S. & D

FOR YOUR REQUIREMENTS OF :

BETA NAPHTHOL

Products SODIUM SULFITE (Com. Grade) & TAR PITCH

Please Contact Manufacturers :



Beta Naphthol Pvt. Ltd.

BOMBAY : 107, V.V. Chandan Street, 1st Floor, Vadgadi, Bombay-400 003.

Phone : 344339/322420.

Cable : BETAOH

1:
6, Mandir Road, Kpura,
Karol Bagh,
Delhi-110 005.
e: 770433

AHMEDABAD:
6, Uttra Apartments,
Opp. Ajanta Com-
mercial Centre,
Near Navjiwan Press,
Ashram Road,
Ahmedabad (Guj.).
Phone: 409953

REGD. OFFICE:
Naramda Chambers, II Floor,
36, Maharaja Agrasen Marg,
Sapna Sangeeta Main Road,
Indore-452 001.
Phone: 61603 Cable: BETA
Telex: 735 349 BNPL IN

WORKS:
5, Industrial Area,
Maksi,
Distt.: Shajapur, M.P.
Phone : 78 & 79

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1. 1,4 DIOXANE — Taiwan
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3. POLYVINYL ALCOHOL — Japan
(Hot & Cold)
4. LITHIUM HYDROXIDE — German
5. LITHIUM CHLORIDE — German
6. ALLYL CHLORIDE — Japan
7. POTASSIUM CARBONATE — Japan

8. 3,4,5 TRIMETHOXY BENZALDEHYDE — Japan
9. GALLIC ACID — Japan
10. ALLYL ALCOHOL — Japan
11. HYDROXYLAMINE SULPHATE — Japan
12. PYRIDINE — Japan/USA
13. SODIUM HYDROSULPHITE — Taiwan
14. BETA PICOLINE — Belgium/USA

Please Contact :

RAJENDRA INTERNATIONAL

Mehsana Mansion No. 2, Block 3,
Tejpal Road, Vile Parle (East), BOMBAY-400 057.
Telephone : 6140800

Bombay Dyes Market

(Prices as on 13th January 1988)

ACID COLOUR	Per Kg
Acid Violet 4BS	143.00
Acid Maroon V	110.00
Acid Orange H	77.80
Acid Orange IIY	63.05
Acid Red A	107.25
Crossin Scarlet MOB	155.00
Acid Scarlet 3R	89.90
Acid Red 38N	135.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Green V	330.00
Acid Patent Blue AS	250.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	121.95
Acid Black BX	98.40
Acid Black Wax	135.50
Procinil Yellow GS (I.C.I., UK)	285.00
Procinil Red GS (I.C.I., UK)	530.00
Procinil Blue RS (I.C.I., UK)	315.00
Procinil Scarlet G (I.C.I., UK)	300.00
Procinil Orange G (I.C.I., UK)	250.00
Procinil Rubine (I.C.I., UK)	550.00
DIRECT COLOURS	Per Kg
Yellow 3GX	88.10
Sun Yellow RCH	124.40
Fast Yellow GCH	141.15
Yellow CFG Hly. Conc.	312.00
Fast Yellow GS	111.85
Fast Yellow CHR3	95.45
Viscose Orange A	166.15
Fast Orange GR	133.75
Red	98.90
Dark Tan	78.25
Red IIR	72.55
Red 4B	169.10
Bordeaux BW	132.30
Fast Scarlet 4BS	166.65
Red 12B	170.55
Bordeaux Hly Conc.	194.00
Cotton Red N	117.05
Brill. Fast Helio B	278.00
Brill. Fast Helio 2B	297.00
Brill. Fast Helio 2RS	136.20
Brill. Fast Helio BS	113.10

Brill. Violet Extra	125.40
Blue 2B	98.60
Blue G	170.50
Sky Blue FB	188.25
Copper Blue GR	147.00
Fast Greenish Blue 3L	114.60
Developed Black BT	116.10
Blue NB-2B	300.20
Blue NB-2BC	185.30
Developed Black NB-2BC	185.30
Green B	111.65
Green NB-B	188.25
Green 2B-N	188.25
Brown MR	154.40
Brown CN	107.25
Golden Brown G	140.35
Catechin G	120.50
Omega Tan	126.40
Catechin GS	102.80
Black E Hly Conc.	142.60
Black E Extra Hly Conc.	142.60
Black NB-ER Hly. Conc.	310.50

DISPERSOL COLOURS	Per Kg
Yellow 6G Powder	143.80
Red B 3B Powder	247.80
Red B 2B Powder	323.20
Red CB Powder	439.15
Red D2B Powder	477.40
Violet C 4R	621.90
Blue BG Powder	235.45
Blue BN Powder	103.75
Blue D 2R Powder	478.25
Navy BT Powder	243.90
Blue B 2G Powder	210.20
Black BT Powder	182.60
Blue BR Powder	390.20
Yellow 7GL	338.60
Yellow 5RX	218.80
Yellow 3G	367.25
Yellow	140.00
Yellow AL	135.30
Yellow Brown REL	247.50
Yellow FFL	463.60
Gold Yellow GG	259.70
Pink REL	247.00
Red REL	468.65
Red 2B	327.40
Red FB	324.20
Red Violet FBL	469.85
Orange 3R	196.65
Violet 3R	280.60
Violet 6R	485.75

Violet RL
Scarlet RR
Rubine 3B
Rubine CB
Blue GL
Blue BGF
Navy Blue RE
Brown 3REL
Black GEL
Dark Brown 3B

BASE COLOURS

Fast Yellow GC
Fast Orange GC
Fast Scarlet R
Fast Scarlet RC
Fast Scarlet RCR
Fast Scarlet G
Fast Scarlet GN
Fast Scarlet GG
Fast Scarlet GGS
Fast Red B
Fast Red RC
Fast Red R Flakee
Fast Red TR
Fast Red TR OH
Fast Red RL
Fast Red KB OH
Fast Bordeaux GP
Fast Garnet GBC
Fast Violet B
Fast Blue BB

NAPHTHOL COLOURS

ASG
AS
ASSW
ABBS
ASBO
ASD
ASOL
ASTR
ASPH
ASE
ASEI
ASLB
ASBT
ASWG
ASSG
ASSR

ON COLOURS		Per Kg.					
Yellow HR	181.80	Navy Blue M 3R	310.95	Blue R Conc. Pdr. Fine	577.65		
Yellow H4G	117.85	Brill. Blue MR	331.70	Blue RR Supra Powder	629.35		
Yellow H-8GP	168.55	Brill. Blue M RX	214.20	Blue Conc. Powder	645.80		
Yellow HE6G	166.95	Brill. Blue M-G	382.30	Brill. Blue 2R Hly. Conc.	378.55		
H-E4R	276.05	Blue M 4GD	344.60	Brill. Blue 2R Supra Disp.	115.65		
Yellow H7G	332.30	Navy Blue M RB	318.75	Dark Blue 2R Powder Fine	389.25		
M4R	243.95	Turquoise M-G	197.85	Blue BC Supra Disp.	359.40		
M GR	326.05	Brill. Blue M GX	302.50	Jade Green XBN Powder Fine	438.20		
Yellow M4G	177.10	Blue 3R Acra Powder	718.29	Jade Green XBN Acra			
Yellow M8G	332.30	Dark Brown H 6R	248.45	Conc. Powder	823.90		
M 3R	217.60	Cobalt Oxide (per kg.)	285.00	Jade Green 2G Pdr. Fine	419.65		
Orange H 2R	241.85	Green H 4BD	269.80	Jade Green 2G Ptg. Paste	125.40		
Red H 7B	157.95	Green H-E4BI	169.80	Jade Green XBN Ptg. Paste	126.00		
Orange M 2R	313.15	Red Brown H IF	143.25	Jade Green 2G Supra Disp.	496.00		
Red H 8B	169.45	Orange Brown H 28	209.05	Olive Green B Pdr. Fine	399.90		
Scarlet H RN	245.05	Brown M GRN	188.80	Olive D Pdr. Fine	444.30		
Red H-3BP	179.30	Black H-N	283.35	Olive Green B Supra Disp.	308.25		
Red H-F3B	243.45	SULFUR COLOURS		Jade Green XBN Supra			
Magenta HB	167.00		Per Kg.	Disp. (N)	327.30		
Red M 5B	98.90	Navy Blue	99.85	Olive OMW Pdr. Fine	698.55		
Red M 8B	173.70	Green G	138.55	Olive OMW Supra Disp.	538.06		
Pink MB	137.10	Black Grains Extra	63.05	Olive R. Pdr. Fine	422.95		
Magenta MB	121.55	Black Grains OG	64.55	Olive D Supra Disp.	361.70		
Purple H-3R	180.20	Black GXE Conc.	61.60	Olive R Supra Disp.	363.90		
Purple H-7R	175.40	Black GXE	52.75	Olive D. Ptg. Paste	193.00		
Blue H 3R	298.50	Black GXR	61.60	Olive Green B. Ptg. Paste	199.10		
Blue H-GR	366.55	Black Grains 800	54.20	Olive Green B Acra Conc.	542.75		
Blue H 5G	173.10	Black EXR Grains	64.55	Olive R Acra Conc.	640.00		
H 5R	283.85	Black EXR Grains 800	51.25	Olive Green B. Acra Conc.	542.75		
Blue H 7G	178.70	VAT COLOURS (ICI)		Brown R Pdr. Fine	835.00		
Blue H 7RX	358.15		Per Kg.	Brown G. Pdr. Fine	795.00		
oise HA	234.45	Yellow 5G Powder Fine	673.15	Brown R Pdr. Fine	659.75		
Blue H-3RP	335.70	Yellow 5G Supra Disperse	439.30	Dark Brown 3R Pdr. Fine	685.00		
Turquoise H 2GF	181.50	Yellow 5G Acra Con.	628.75	Brown G. Supra Disp.	449.90		
H-ERD	305.80	Yellow 3R Powder	588.85	Brown 2G Supra Disp.	554.00		
Blue H ER	258.60	Gold Orange 3G Pdr. Fine	952.15	Brown R Supra Disp.	422.95		
H 5RX	269.30	Brill. Orange 6R Pdr. Fine	624.35	Brown BR Powder	719.00		
		Gold Orange 3G Supra Disp.	601.30	Dark Brown 3R Ptg. Paste	217.15		
		Brill. Orange 6RX Powder	394.30	Dark Brown 3R Supra Disp.	414.55		
		Brill. Red 3B Pdr. Fine	997.80	Brown G Acra Conc.	733.95		
		Brill. Red 3B Supra Disp.	713.20	Brown R Acra Conc.	766.00		
		Brill. Purple 4R Conc. Pdr.	470.75	Grey M. Powder Fine	768.80		
		Brill. Purple 3R Acra Powder	690.85	Grey M. Supra Disp.	585.45		
		Brill. Purple 2R Hly Conc.	597.90	Blue BC Acra Conc. Pdr. Fine	762.70		
		Brill. Purple 4R Supra Disp.	500.05	Direct Black AC Supra Disp.	330.35		
		Brill. Purple 2R Acra Conc.	625.95	Direct Black AC Pdr. Fine	474.70		
		Blue R Powder Fine	542.15	Direct Black CH Supra Disp.	393.20		
		Blue BC Conc. Pdr. Fine	522.50	Direct ACD Ptg. Paste	217.15		
		Blue BC Acra Conc. Pdr. Fine	762.70				

Delhi Market

DELHI: JAN. 15 (NNS) — Mercury recorded a handsome gain of Rs. 300 at Rs. 9000 per flask in the local chemicals market during last week followed by higher advices from Bombay and lack of selling by stockists in hope of further increase in its prices, says NNS. Rangolite German went up by Rs. 6 at Rs. 68 per kg. owing to disruption of transportation owing to the strike of the transport labour. Consequent inflow was limited in Bombay. Sufolight jumped up from Rs. 50 to Rs. 56 in the absence of fresh arrivals as well as fall in production. Chatkolight firmed up by 50 paise. Hydro sulphite Tamilnadu firmed up by Rs. 2 at Rs. 32 in the absence of comfortable stock position.

Citric acid Bombay Dyeing hardened by Rs. 50 at Rs. 2,450 in the absence of arrivals from Bombay due to transport strike. Menthol flake and bold hardened from Rs. 167 and Rs. 184 to Rs. 185 and Rs. 205 per kg. respectively in the beginning of the week owing to good stockists demand along with fall in arrivals from U.P. but at the week-end it reacted downward by Rs. 5 each and closed at Rs. 180 and Rs. 200 owing to profit taking selling by stockists, thus showing a net profit

of Rs. 13 and Rs. 15 over previous week level. Mentha oil advanced by Rs. 10 at Rs. 145 per kg.

Copper sulphate quoted higher by Rs. 100 at Rs. 1800/2100 owing to paucity of supply. Paraffin wax gained Rs. 5 at Rs. 580 in the absence of stocks. Titanium dioxide RC-822 recorded a sharp gain of Rs. 6 at Rs. 73 in the absence of arrivals from Kerala along with heavy mutual speculations among stockists and speculators. Titanium dioxide Anatase advanced by Rs. 2.50 at Rs. 53.50 per kg. Naphthalene balls moved up by Rs. 20 and touched a new peak of Rs. 1200 per 50 kg. due to increased prices of raw material. Formic acid and Tri-Sod. Phosphate looked up by Rs. 15 each.

Soda ash Tata and Birla declined by Rs. 5 at Rs. 285 each per bag on easy supply as well as lack of demand. Soda ash NAL and FNFC ruled quiet at Rs. 267 and Rs. 255. Caustic soda flake however, drifted lower from Rs. 385/388 to Rs. 378/385 due to poor offtake and comfortable supply. Ammonia bicarb softened by Rs. 5 owing to improvement in arrivals.

No change was recorded in dyes and colours.

Copper Sulphate (per quintal)	1800-2
Formic acid (per kg)	
Formaldehyde (per kg)	
Hydrogen Peroxide (per kg)	20
Calcium Carbonate (per tonne)	2500-4
Acid Slurry Soft (per kg)	
Acid Slurry Hard (per kg)	
Phosphoric Acid (per 50 kg)	
Pot. N'trate (per quintal)	900-1
Pot. Permanganate (per 50 kg)	2
Sod. Bichromate (per 50 kg)	1025-1
Tri-Sod. Phosphate (per 50 kg)	325
Titanium Dioxide Anatase (per kg)	
Titanium RC-822 (per kg)	
Zinc Oxide (per mt)	34000/38
Phenol Carbolic Acid (per kg)	
Carbon Tetrachloride (per kg)	
Chloroform (per kg)	
Sodium Sulphate (per 50 kg)	160
Naphthalene Balls (per 50 kg)	

DIRECT DYES

Naphthol AS	
Naphthol ASG	
Naphthol ASBS	
Naphthol ASTR	
Naphthol ASOL	
Naphthol ASBO	

DIRECT DYES

Black E. Conc.	92
D'azo Black B.T.	
Green B.	
Blue 2-B	
Sky Blue FB	
Basic Auramine 'O' Conc.	55
Basic Rhodamine B.500%	220
Basic Methylene Blue	92
Basic Violet	142
Basic Malachite Green	160
Acid Orange	

(DELHI MARKET RATES AS ON JANUARY 15, 1988)

Ammonia Bicarb (per 25 kg)	130.00	Boric acid Technical (per 50 kg)	1000.00
Mercury (per flask)	9000.00	Paraffin wax (per 50 kg)	580.00
Soda ash (per bag)	255-285.00	Tartaric acid (per 50 kg)	7,250.00
Ammonium Chloride (per 50 kg.)	110-180.00	Borax Granular (per 50 kg)	580.00
Caustic soda solid (per 50 kg)	390.00	Borax Crystal (per 50 kg)	580.00
Caustic soda flakes (per 50 kg.)	378-385.00	Sodium Nitrite (per 50 kg)	650.00
Citric acid (per 50 kg.)	2250-2450.00	Sodium N'trate (per 50 kg)	380.00
Stable Bleaching Powder Shriram (per 25 kg)	96.00	Camphor Powder (per kg)	87.00
Stable Bleaching Powder KCI (per 25 kg)	89.00	Camphor Thal (per kg)	95.00
Stable Bleaching Powder MODI (per 25 kg)	92.00	Menthol Flake (per kg)	180.00
Sod. Bicarbonate (per 50 kg)	250.00	Menthol Bold (per kg)	200.00
Sod. Hydro Sulphite (per kg)	32-36.00	Menthol Medium (per kg)	190.00
Rangolite (per kg)	42.50-68.00	Glycerine (per kg)	45-55.00
		Sodium Silicate (per quintal)	250.00
		Hexamine (per kg)	26.00
		Acetic Acid Glacial (per kg)	14.50-18.00

Madras Market

al conditions prevailed in the chemical market during the under review. Not much of business was transacted due to Pongal.

ic Acid Glacial was traded at Rs. 600 and Borax Granular at Rs. 600

per kg. Caustic Soda Flakes maintained even trend at Rs. 7,900 per kg. while Soda Ash items remained steady.

Solvents and dyes remained steady, and all other items maintained their previous levels.

(MADRAS MARKET RATES AS ON JANUARY 16, 1988)

Acid Glacial (per kg)	17.00	Hydrosulphite of Soda IDI (per kg)	37.00	Sodium Silicate (per tonne)	4000.00
um Sulphate Iron Free (tonne)	2,100.00	Hydrosulphite of Soda BASF (per kg)	39.00	Sodium Bisulphite (Aswin) (per tonne)	225.00
um Bicarbonate 25 kg)	125.00	Hydrogen Peroxide Ind an (per kg)	30.00	Sodium Acetate (per kg)	150.00
um Chloride SPIC (tonne)	2,000.00	Magnesium Carbonate (per kg)	18.00	Sodium Sulphate Powder (per tonne)	2,000.00
ng Powder (per 25 kg)	100.00	Magnesium Chloride (per kg)	5.00	Sodium Sulphide Flakes (per tonne)	12,000.00
Granular (per 50 kg)	600.00	Oxalic Acid (per 50 kg)	1,000.00	Toluene (per litre)	14.00
n Chloride (per 50 kg)	175.00	Potassium Bichromate (per kg)	30.00	Trisodium Phosphate (per 50 kgs)	325.00
Soda Flakes Andhra (tonne)	7,900.00	Phosphoric Acid (per kg)	17.00	Urea Tech (per kg)	2.80
Soda Flakes Mettur (tonne)	7,900.00	Soda Ash (DCW) (per 75 kgs)	295.00	Zinc Oxide (per kg)	30.00
Soda Flakes D.C.W (tonne)	7,900.00	Soda Ash TAIA) (per 75 kgs)	325.00	Acetone (per kg)	18.50
Acid Deshi (per 50 kg)	1,200.00	Soda Ash (TAC) (per 75 kgs)	320.00	Benzene (per kg)	14.00
Sulphate (per 50 kg)	1,050.00	Sodium Bichromate (per kg)	19.00	Carbon Tetra Chloride (per kg)	13.00
ic Acid (per kg) GAL	46.00	Sodium Bichromate TATA (per 50 kg)	280.00	Cellosolve (per kg)	50.00
Acid (per kg)	30.00	Sodium Cyanide (EGGS) (per kg)	47.00	Chloroform (per kg)	23.00
dehyde (per kg)	7.00	Sodium Nitrate (per 50 kgs)	415.00	Diacetone Alcohol (per kg)	28.00
ne (per kg)	26.00	Sodium Cyanide Degussa (per kg)	80.00	Dibutyl Phthalate (per kg)	48.00
sulphite of Soda TCPL (per kg)	31.00	Sodium Nitrite Bags (per 50 kgs)	675.00	Diethylene Glycol (per kg)	32.00
				Sorbitol (per kg)	30.00
				D'octyl Phthalate (per kg)	49.00
				Isopropyl Alcohol (per kg)	21.25
				Methyl Ethyl Ketone (per kg)	28.20
				Trichloroethylene (per kg)	23.00
				Turpentine Oil (per kg)	16.00
				Phenol (per kg)	29.00
				Butanol (per kg)	40.00
				Isobutanol (per kg)	38.00
				Paraffin Wax (per Bag)	13.50
				Pentaerithritol (per kg)	52.00
				Glycerine (per kg)	48.00
				Phthalic Anhydride (per kg)	24.00
				Hyflosupercel (per kg)	19.00
				Zinc Chloride (Powder) (per kg)	13.00
				Zinc Sulphate (per tonne)	4,000.00

Materials Exported

BOMBAY

(From 17-11-87 to 23-11-87)

(Cost of Imported Item is CIF Value)

ALUMINIUM CHLORIDE ANHYDROUS GRANULES: To Felixstowe: Mangalam Rasayan P. Ltd., Bombay, 19,800 kgs., Rs. 2,07,616; To Tilbury: Mangalam Inorganics P. Ltd., 19,800 kgs., Rs. 2,07,616.

ALUMINIUM HYDROXIDE: To Mombasa: Industrial Product Trading Co., 370 M.T., Rs. 1,06,500.

ALUMINIUM PHOSPHATE: To Bandar Abba: Tata Exports Ltd., 5,895 kgs., Rs. 4,99,061.

ALUMINIUM PHOSPHATE: To Manila: United Phosphorus Ltd., 1,350 kgs., Rs. 1,62,014; To Bandar Abba: Tata Exports Ltd., 3,225 kgs., Rs. 2,72,691.

AROMATIC CHEMICALS: To

New York: K.V. Arochem Ltd., Bombay, 3,000 kgs., Rs. 2,15,000/- To Singapore: Keva Fragrances Ltd., 500 kgs., Rs. 65,000.

BENZYL ALCOHOL: To Singapore: K. V. Arochem Ltd., 1,000 kgs., Rs. 27,900.

BUTYRIC ACID: To London: Hindustan Lever Ltd., 200 kgs., Rs. 48,000.

CALCIUM HYPOCHLORITE: To Mombasa: Modi Alkalies and Chemicals, 40 M.T., Rs. 1,50,000.

CASSELLA ACID: To Keelung: M/s. Priya Electronics and Chemicals, 2,248 kgs., Rs. 2,64,043.

2, 5-DICHLORO-4-SULFOPHENYL -3-METHYL-5-PYRAZOLONE: To Genoa: Priya Electronics & Chemicals, 2,950 kgs., Rs. 2,75,666.

ELECTROPLATING CHEMICALS: To Lagos: Grover & (I) Ltd., 500 kgs., Rs. 21,350.

FERROUS SULPHATE TABLETS: To Lagos: Co Pharmaceuticals, 3,500 kgs., Rs. 87,385/-.

LINDANE TECHNICAL: To Singapore: India Pesticide Ltd., 5,000 kgs., Rs. 6,15,000.

MAGNESIUM CARBONATE LIGHT: To Dar-es-Salaam: Mineral Minerals and Chemicals, 1,000 kgs., Rs. 199,000.

MANGANESE DIOXIDE: To Keelang: Selective Mincher Color Industries, 6,300 kgs., Rs. 2,43,615.

MANGANESE DIOXIDE: To Keelang: Bharat Verising Mills, 42,350 kgs., Rs. 57,240.

MENTHON EX-MENTHON: To Rotterdam: Hindustan Ltd., 1,000 kgs., Rs. 57,240.

MUSK XYLENE: To Haripur: K.V. Arochem Ltd., 2,000 kgs., Rs. 1,33,000.

MUSK XYLOL: To Live: K.V. Arochem Ltd., 1,500 kgs., Rs. 1,03,482.

PHENYL MERCURIC TATE: To Sydney: United Phosphorus Ltd., 1,000 kgs., Rs. 1,39,816/-.

RED OXIDE POWDER: To Bangkok: Atam Singh K. Brothers, 21,000 kgs., Rs. 23,982/-.

RED PHOSPHOROUS: To New York: Phosphorous Ltd., 12,871 kgs., Rs. 4,39,970.

SHELLAC: To Port Said: Impex P. Ltd., 12,000 kgs., Rs. 3,91,590/-.

SODIUM FORMALDEHYDE SULPHOXYLATE: To Transpek Industry Ltd., 1,000 kgs., Rs. 2,68,008/-.

SODIUM HYDROSULFIDE: To Barcelona: Tamil N. Chemical Products, 33,000 kgs., Rs. 4,14,980.

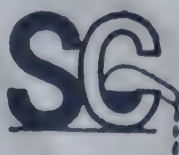


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erdam : Pidilite India P.
00 kgs., Rs. 3,59,444.

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Industrial Minerals &
als, 20,000 kgs., Rs.

A YARA : To Singapore :
ochem Ltd., 1,000 kgs.,
000.

OW PHOSPHORUS : To
Abba : Excel Industries
7,925 kgs., Rs. 30,24,021.

FORMALDEHYDE SUL-
LATE : To Busan : Trans-
lustry Ltd., 200 kgs., Rs.

OXIDE: To Casablanca:
nc India P. Ltd., 20,000
ts. 1,93,167.

S MATERIALS EXPORTED BOMBAY

n 17-11-87 to 23-11-87)

PICILLIN TRIHYDRATE
ACTED : To Penang : Gu-
yka Organics Ltd., 150
ts. 1,34,034

ACHING POWDER : To
pore : Modi Alkalies and
cals, 20 MT's, Rs. 67,000.
RIC ACID : To Aden : Uni-
Foundry P. Ltd., 200 kgs.,
107.

UCINE SULPHATE NF
DER : To New York : Che-
ls, 1,134 kgs., Rs.
248.

LK DRUGS : To Hamburg:
dia Chemical Co. Ltd., 500
Rs. 1,20,631.

TENE DIOL : To Kelang :
it Pulverising Mills, 3,000
2,52,908.

HYDRATED CASTOR OIL:
Hamburg : Enlite Chemical In-
ies P. Ltd., 19.49 tons, Rs.
333.

PHENYLHYDANTOIN USP:
Hamburg : Orgamine Chemi-
1,000 kgs., Rs. 2,34,560.

RUGS : To Singapore : In-
rial Trading Co., 900 kgs.,

Rs. 1,04,579. To Port Louis:
Bombay Drug House, 4,400 kgs.,
Rs. 2,87,000. To Port Louis: In-
dustrial Trading Co. 1,380 kgs.,
Rs. 1,63,979.; 558 kgs., Rs.
60,983.

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MEDIATE : To Hamburg : Metro
Exporters P. Ltd., 4,000 kgs., Rs.
8,59,069; To Toronto: Metro Ex-
porters P. Ltd., 3,000 kgs., Rs.
5,93,160.

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Hamburg: Glindia Ltd., 4,000
kgs., Rs. 10,42,050.

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To Penang : Bombay Drug
House, 150 kgs., Rs. 1,24,900.

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CARBON : To Aden : Universal
Foundry P. Ltd., 5,000 kgs., Rs.
36,004.

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To Hamburg : German Remedies
Ltd., 17,204 kgs., Rs. 9,32,635/-

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burg: G. Amphrey Laboratories
2,000 kgs., Rs. 4,71,863.

IBUPROFEN : To Hamburg
Chandra Pharmaceuticals Ltd
4,000 kgs., Rs. 9,16,557.

IBUPROFEN B.P. : To Lon-
don: Chandra Pharmaceuticals
Ltd., 200 kgs., Rs. 49,014.

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NOLINE : To Hamburg: Chemis-
tar, 1,500 kgs., Rs. 3,35,272.

METHYLENE CHLORIDE : To
Kelang: Gujarat Alkalies & Che-
micals, 18,000 kgs., Rs. 97,000/-

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ZOATE : I.P. : To Hamburg: FDC
P. Ltd., 1,000 kgs., Rs. 2,34,280.

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& Investments, 1,524 kgs., Rs.
1,02,000.

ORTHODICHLOROBENZENE :
To Singapore : Nascent Chem In-
dustries P. Ltd., 20,000 kgs., Rs.
1,98,423.

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nila: Pre Koll, Bulsar, 3,150 kgs.,
22,50,000.

PARACETAMOL BP 80 : To
Hamburg: A.P. Chemicals, 12,500
kgs., Rs. 7,09,593.

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To Monrovia: Pohornal Keval-
ram Sons, 86 kgs., Rs. 11,590.

PHARMACEUTICAL PRO-
DUCTS: To Port Louis: Bombay
Drug House, 57 kgs., Rs. 37,000.

SODIUM CYANIDE : To Free-
mantle: Gujarat Alkalies & Che-
micals, 13,300 kgs., Rs.
1,42,000.

SULPHAMETHOXAZOLE B.P.:
To Hamburg: Metro Exports P.
Ltd., 4,500 kgs., Rs. 9,66,453.

THIACETAZONE BPC : To
Hamburg: Orex Pharma P. Ltd.,
1,000 kgs., Rs. 1,31,997.

TINIDAZOLE : To Hamburg:
Lyka Laboratories Ltd., 500 kgs.,
Rs. 1,23,850. Rokadia Chemical
Co., 500 kgs., Rs. 1,20,030.

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ALUMINIUM CHLORIDE : To
London : Mangalya Trading & In-
vestment, 37,750 kgs., Rs.
3,30,840.

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HYDROUS : To London : Manga-
lya Trading & Investments,
17,875 kgs., Rs. 1,65,420.

ANTHRANILIC ACID : To
Keelung : Espee Chemicals,
Bombay, 5,000 kgs., Rs.
2,45,677.

BASIC YELLOW : To Keelung:
Indian Dyestuff & Chemicals,
2,000 kgs., Rs. 81,475/-.

BLACK AVN PASTE : To Sin-
gapore : Colour-Chem Ltd., 250
kgs., Rs. 3,617; 250 kgs., Rs.
3,617.

BLACK FBRK: To Bangkok:
Colour Chem Ltd., 500 kgs., Rs.
7,621; 150 kgs., Rs. 2,265;

BLACK 209 : To Jakarta : Ta-
rang Dyestuffs Industries, 6,000
kgs., Rs. 4,62,082.

BLACK IRON OXIDE: To
Manila : Bharat Pulverising Mil-
ls P. Ltd., 1,560 kgs., Rs. 1,656.
780 kgs., Rs. 828.

CHLORANIL : To New York :
Gujarat State Export Corpora-
tion, 5,000 kgs., Rs. 3,13,000.

CHRY SOPHENINE 100%: To
Bangkok: Monarch Dyestuff In-
dustries, 100 kgs., Rs.
44,021.

COALTAR DYES: To Momba-
sa: Indian Dyestuff Industries P.
Ltd., 1,000 kgs., Rs. 88,384; To
Charleston: Indian Dyestuff In-
dustries, 1,500 kgs., Rs. 1,64,412;
To Rotterdam: Indian Dyestuff
Industries, 40 kgs., Rs. 1,65,453
To Bangkok: Indian Dyestuff In-
dustries, 6,010 kgs., Rs. 1,31,-
000; 6,010 kgs., Rs. 1,31,000.

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BLUE: To Rotterdam: Jayendra-
kunon Hiralal Kharawal, 7,500
kgs., Rs. 3,55,000.

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sia: M/s. Atlas Dyechem Indus-
tries, 7,000 kgs., Rs. 5,19,309.

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Rotterdam: Golden Dyes Corpora-
tion (I) P. Ltd., 500 kgs., Rs.
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DIRECT RED: To Mombasa:
Indian Products Trading Co., 300
kgs., Rs. 36,000.

DIRECT SUFAST YELLOW :
To Mombasa: Indian Products
Trading Co., 1 kg., Rs. 93,000.

DYES: To Antwerp: Mo
Dyestuff Industries, 5,000
Rs. 3,76,130; To Jakarta:
Exporters P. Ltd., 1,000 kg:
51,711.

DYE INTERMEDIATES:
Bangkok: Jindal Dye Interr-
tes P. Ltd., 4,371 kgs.,
1,45,000.

DYES INTERMEDIATE:
Busan: Hickson & Dadajee
5,240 kgs., Rs. 5,00,883;
kgs., Rs. 4,98,431; To Han
Mangalya Trading & I
ments, 7,279 kgs., Rs. 2,00
To London: Indian Dyestuff
stries, 5,000 kgs., Rs. 3,35
To Jakarta: Espee Chem
Bombay, 5,348 kgs., Rs.
820; To Osaka: Liberty. E
P. Ltd., 1,460 kgs., Rs. 1,12
To Bangkok: Espee Chem
3,350 kgs., Rs. 2,43,377;
karta: Liberty Exports P.
5,600 kgs., Rs. 5,58,476
Busan : Priya Electronics &
micals, 1,000 kgs.,
1,55,187; To New York :
Import Export P. Ltd., 2,500
Rs. 2,83,840.

FAST BLUE CBR : To F
dam : Colour Chem Ltd.,
kgs., Rs. 12,41,325.

FAST BORDEAUX GP B
To New York : Vibgyor Dye
1,000 kgs., Rs. 1,03
1,000 kgs., Rs. 1,04,000.

FAST RED TR BASE :
verpool : Amritlal Chemaux
2,000 kgs., Rs. 2,73,685.

GAMMA ACID : To Ham
Mangalya Trading & Inves
ts : 3,400 kgs., Rs. 3,60,

H. ACID : To New Y
Bhoir Import Export P.
2,800 kgs., Rs. 2,32,510
Keelung: Metrochem Indus
3,846 kgs., Rs. 3,65,151
Bangkok: Vivid Exports,
kgs., Rs. 3,13,443; To B
Sajjan Impex P. Ltd., 6,300
Rs. 5,89,488; To New York
kul Enterprise, 19,231 kgs.
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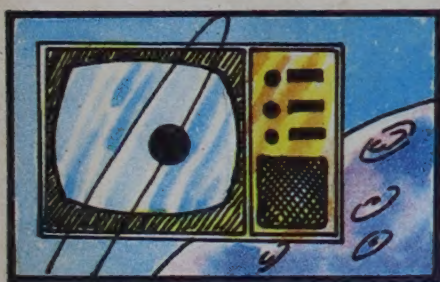
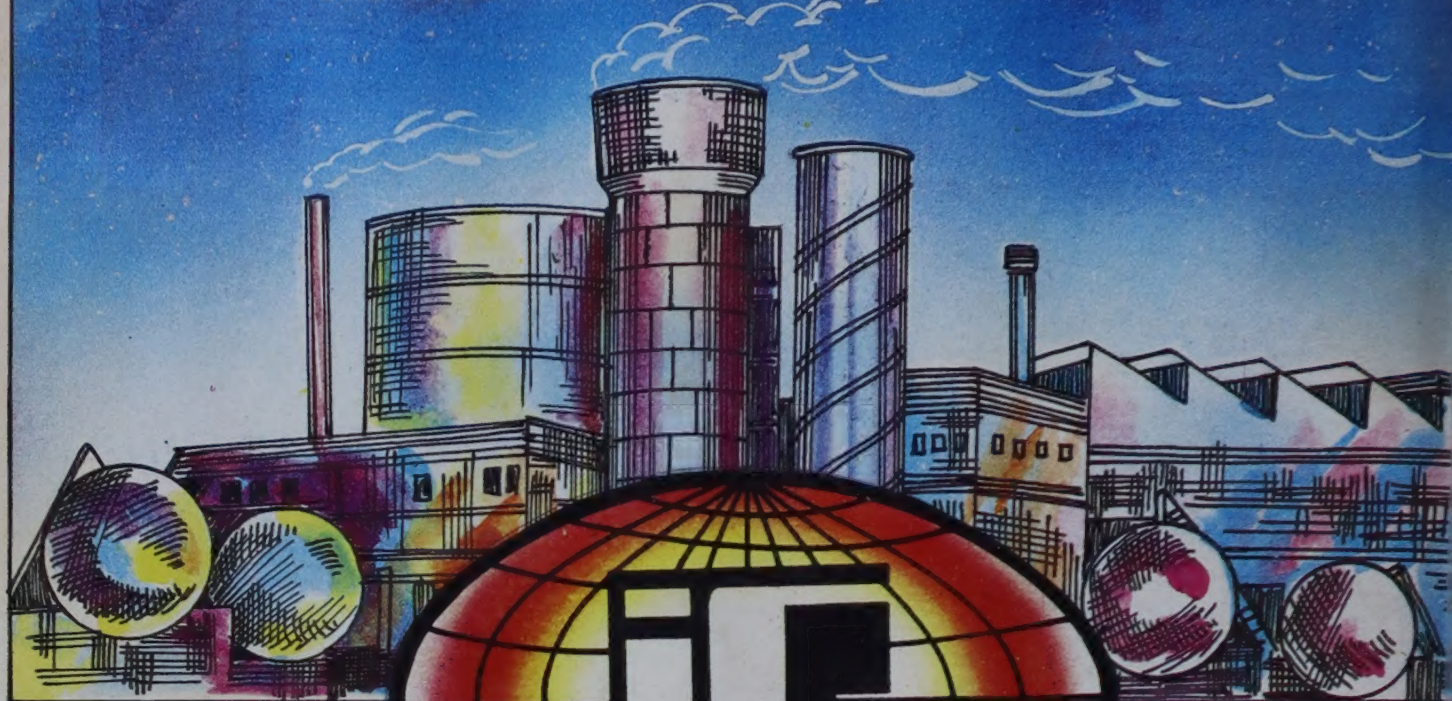
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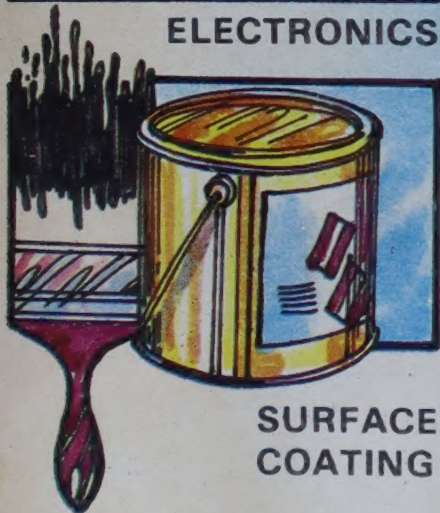
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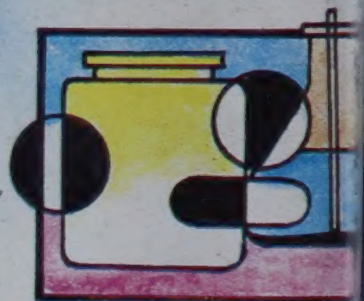
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